We're all living in very interesting times.

The emergent sustainable transformation of local sociotechnical regimes depending on fossil resources

A narrative discourse analysis for the case of Barrancabermeja, Colombia

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Für Henny und Alma; für Friedrich und für Erhardt.

ABSTRACT

The world is fossil fueled. There is black gold in banks, lungs, ground waters, engines, fish stomachs, strategy papers and the atmosphere. According to scientists, it locks-in consumers, curses producers and gradually but severely pollutes our habitat. Transformations in the use of resources and the generation of energy are a central pillar of the sustainable development agenda, a comprehensive strategy set up by the global political community to combat contemporary societal grand challenges related to social justice and climate change. A few decades into the debate, the performance of measures such as energy and resource efficiency, emission reduction, ecological preservation and similar raises doubts about sustainability, being increasingly debated in terms of what interests it serves and of how it relates to the epistemological barriers it fails to overcome. The innovative mind oscillates somewhere between realities' overwhelming boundaries and imagining beyond.

Wondering about the possibility and emergence of respective transformations in the multitude of local contexts dependent on fossil resources, this study concentrates on a place where every story begins and ends with petroleum. The world of the Colombian town Barrancabermeja has been depending on the ups and downs of an economy built on the exploration, production, refining and transportation of crude oil since the beginning of the past century. In the frame of a qualitative research project on transformative innovation policymaking in Colombia, this master thesis is interested in emergent sustainability transformations encoded in subjective narratives about the territory. In other words, it aims at collecting all that Barrancabermeja is "not yet" (Ernst Bloch) by means of listening to local citizens.

Gramsci introduced "hegemony" as a notion for the analysis of how humans structure their systems. The concept found common application in the study of international relations and was further refined with the rediscovery of Lacan and the subsequent language turn in social sciences. Taking over this discourse theoretical perspective and integrating it with Geel's multilevel perspective, this work explores the emergence of productive sectors and activities as windows of opportunity for sustainable future projection of local economies highly dependent on fossil resources. For the specific analysis of the case of Barrancabermeja, ethnographic observations as well as in-depth interviews have been engaged to collect data, whose narratives where analyzed based on de Sousa Santos' knowledge sociological approach. Finally, policy recommendations are derived in order to explore, how these findings can be used for constructing local solutions to the global problem of transforming our fossil-dependent modern society.

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The universe is made of stories,
not of atoms. [1]

[1] Rukeyser, M. (1994). *Out of silence: Selected poems*. Northwestern University Press.

We are less than atoms, I say, because the atom obeys the law of its being, while we, in the arrogance of our unknowingness, deny the law of nature. [1]

[1] Gandhi, M. as cited by Kraus, F. (1957). Vom Geist des Mahatma. *Ein Gandhi-Brevier, Baden-Baden: Holle*.

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I. INTRODUCTION

In regard of the state of current global levels of environmental destruction and social inequality, the social world finds itself challenged. Industrial activities, transportation and patterns of consumption are increasingly regarded as being completely out of tune with the capacities of the biosystems we inhabit. The notion of transformation experienced a sort of renaissance in the public and academic debate, when sustainable development was put on top of the global policy agenda in the 1980s. Since then, there has been a significant increase in environmental research (Goni et al., 2015) and press coverage on respective issues. Global institutions such as the IPCC were formed in order to produce knowledge on climate change and to inform global policy making. New social and ecological movements engaged radical and often apocalyptical (Swyngedouw, 2010) narratives about societal futures based on the recognition that it simply won't be feasible to eternally sustain resource-based growth. With this outlook, there was no easier conclusion than that "the entire system must be changed" (Brown, 2016, p.125), which channelled into popular demands for profound changes in predominant social orders, such as economic models and epistemic traditions.[1]

In response to an emerging ecological crisis discourse, actors such as the United Nations Environmental Program (2011), the OECD (2011) or the World Bank (2013) fostered the concept of sustainability in the form of green growth, an attempt at harmonizing the urge for ecological preservation and social justice with the widely agreed obligation to maintain economic development on the long-run. Eventually, the ecological damage was not only framed as a threat to live on earth but to economic growth (OECD, 2016). A green economy was framed as a concept that would succeed at delivering economic, social and environmental benefit, which besides was a convenient prospect in the aftermath of the financial crisis (Urhammer & Røpke, 2013, p.2). Alleviating economic growth of its negative environmental impact, was narrated as a mere question of developing the right set of technology.

At the very centre of all this debate stands the utilization of unrenewable natural resources and the "massive input of energy and minerals" (Gray, 2008) for maintaining economic growth. As a highly effective factor of production (World Energy Council, 2018; Ayres et al., 2009), fossil resources have been fuelling global production and transportation chains including the machines that run civil society for the past two centuries. Nowadays, they are considered one of the main environmental pollutants (Ritchie & Roser, 2019). In the form of gas emission, carbonate dioxide pollutes the air and warms the global climate, while in the form of spilled oil, large to micro plastic waste, floating around oceans and piling up on land in vast amounts, or of chemicals and fertilizers, it contaminates biosystems and food chains, contaminates natural resources, such as water, air and soil and causes the loss of biomass and biodiversity (Marinescu et al. 2010).

[1] cf. recent popular non-fiction such as "This Changes Everything" (Klein, 2015); "The Ecological Rift (Bellamy Foster, 2011) or "Storms of my Grandchildren. The Truth About The Climate Catastrophe And Our Last Chance to Safe Humanity (Hansen, 2009).

With a stable trend of global economic and population growth, however, both the demand for energy and product consumption are expected to rise. The fabrication of plastics, for example, has tripled between 2000 and 2015, to an amount that accounts for half of all plastics produced since the 1950s (Ritchie & Roser, 2018). Apart from that, the demand for fossil fuels is forecasted to annually rise by 1.2 mb/d for the upcoming decade if not slowed down by the effective replacement of fossils with renewable sources of energy (World Energy Council, 2018).

Roughly twenty years ago, the United Nations established a global sustainable energy regime focused on the agreement and implementation of emission reduction mechanisms. The malfunctioning of these regimes in enrolling genuine transformation processes has predominantly been put into the perspective of political power (Burke & Stephens, 2018) and bad governance (e.g. Holden et al., 2017, p. 7) combined with the exploitation of a "green" narrative delivering "definitions that everyone could recognise as desirable, but whose concrete implementation would remain unclear" (Brown, 2016, p. 126). The political process of change which unfolded in snail's pace would not be more than a "passive revolution" (Wanner, 2015) conducted within a persistent institutional framework and led by established interests, which simplify the challenge at stake "in favour of a singular technocratic response that leaves the capitalist system intact." (Brown, 2016, p.126). Furthermore, this approach helps greening, and thereby to some extent legitimizing, highly questionable economic operations and conventional developmentalism (Acosta; 2011, Brand, 2011; Gudynas, 2005), promoting environmental preservation and social justice but remaining based on resource production in the so-called global South and knowledge production in the so-called global North. Standing at the centre of an old but greened hegemonic discourse, the ideal of 'sustainability' became a blank space that could fit radical environmental positions and conventional economic agendas alike (Brand, 2011; Barnatt, 2013) and will, according to Holden et al., (2017) and Ferguson (2015) only be fruitful if the underlying measures can genuinely be transformed. It is this paradigm delivering the very foundational ideas societies are designed by, which is identified as the greatest "leverage point" (Meadowcroft, 2009) for systemic constructive change.

1.1 A global ideal and local realities

Underlying the perceived need for a paradigm shift is that there is little idea about how such a transformation could actually look like. Analyses as those mentioned above exemplify how contemporary paradigms inform quantitative targets for the reduction of negative impacts of human activity within our ecosystem, such as the maintenance of an annual temperature rise or shared rules on the implementation of such measures. Besides all criticism towards economic and political leaders failing to take smart and quick decisions, looking carefully at the way problems and solutions are scaled can deliver deeper insights into the construction and history of those paradigms and those expectations that inform our systems. It helps us see, for instance, how the global climate regime resorts to familiar and hence convenient instruments from the toolbox of international relations, such as contractually

setting rules of the game or creating trade regimes, now simply applied to carbon emissions and to the treatment of "nature". Of course, that is no paradigm change. But then, what is?

This consideration represents the point of departure for this thesis. Hence, it builds on the present and past of our modern paradigm and is designed upon the conviction that emergent sustainability transformation towards a post-carbon era need to be identified in local realms in order to project their specific capabilities to the future. Right now, there is little persuasive conceptualization about what a sustainable modern society might concretely look like (Jasanoff & Kim, 2013, p. 189). What would change or have to be changed in a world that ceases to rely on fossil fuels? What infrastructure would it be based on? What does life and interaction look like in this future? Besides the influence of powerful and vested interests[2], the lack of an (optimistic) imagination about such a future and about innovating our present seem to play their part in the ineffectiveness of the sustainability agenda throughout the last decades. The lack of action originates not only in a lack of will, but of possibility (and trust in it). On top of that, in various places and conditions on the globe the complexity of fossil resource dependence moves beyond the mere consumption of hydrocarbons for e.g. the generation of energy or transportation when rethinking systems and paradigms. The *production* of fossil resources is an additional factor to be considered in the conceptualization of sustainability transformations, as diverse examples from all over the world show.[3] In the Colombian city of Barrancabermeja, for example, the establishment of a petroleum industry has drastically transformed the territorial condition.

With the initiation of extractive activities 100 years ago, Barrancabermeja has become Colombia's oil capital and its local economy has been almost entirely depending on the exploration, production, refining and transportation of petroleum. Barrancabermeja is home to the country's largest refinery, which produces around 70% of the country's fuel. The basin of the river Magdalena is rich in fossil resources, and the production of crude oil amounted to around 45.000 barrels per day in 2017. Furthermore, the town finds itself in a strategically propitious location, being well connected by land and water routes. Yet, 67,14% of the inhabitants of the wider region around the Magdalena basin, called Magdalena Medio, live in poverty, amongst which 21,64% suffer conditions of extreme poverty (PNUD, 2014). Considering the progressive role that the Colombian government developed within the global sustainability regime (Bustos, 2017), the case of Barrancabermeja illustrates a drastic example for the divergence of sustainable development legislation with the local reality of socially and environmentally unsustainable economic activity. More than two decades after the implementation of the environmental law (Law 99 of 1993), which provides a comprehensive institutional structure for guiding human and especially economic activities along the lines of sustainable development, the region experienced an increase in extractive economic operations with drastic environmental impacts, amongst which the loss of biomass and biodiversity as well as the contamination of water can be considered the most

[2] These vested interests are supported by global governments with $444 billion, see http://priceofoil.org/2015/11/11/empty-promises-g20-subsidies-to-oil-gas-and-coal-production/

[3] Examples are diverse, ranging from India, Nigeria, Saudi Arabia, Kuwait, Venezuela to the Netherlands and more (cf. https://www.worldatlas.com/articles/countries-the-most-dependent-on-fossil-fuels.html

problematic. Within the same decade, Barrancabermeja experienced the implementation of neoliberal reforms that weakened civil society actors and, at the same time, staged some of the most violent armed confrontations of the Colombian civil war (Gill, 2009). Today, the most important economic site of the country (after the "big" cities like Medellin, Bogotá, Cali or Barranquilla) suffers the highest rates of unemployment in the country (DANE, 2018) as well as a high degree of intransparent governance.

When addressing the issue of local economic alternatives, policy-makers in Barrancabermeja are thus challenged with the highly complicated task of balancing local governance between complex political interests and power relations, a widely naturalized perception of an economic lock-in in a fossil resource-based economy, increasing environmental pressures, a climate of uncertainty as well as popular and increasing demands for social equality and justice in times of multiple societal transformation processes; the latter of which are taking place in e.g. the dimensions of post-war territorial justice, of the ecological challenge and of the digital transformation.

1.2 Topic-related research

Opting for a local zoom-in from the global goal of transforming modern societies towards sustainable livelihood, this thesis takes a closer look at Barrancabermeja as a case of high and direct fossil-fuel dependence. Before putting this consideration into concrete research questions, we proceed with a quick look into the relevant scientific literature in order to work out, where this research project connects to and what gaps it can possibly fill.

To begin with, the sociotechnical perspective adopted by this thesis is a research tradition that understands science, technology and innovation as a social construction (e.g. Winner, 1993; Bijker et al., 1987). In other words, society is defined and 'made' by its technology and at the same time, technology is a social product; supported by political and cultural institutions, economic objectives, and legal and material infrastructures. The two realms cannot be understood separately from another. Within this strand, the multilevel perspective (Geels, 2010; 2002) has been developed in order to model how locked-in regimes and their transformation are subject to changing conditions (landscape shocks) and emerging innovation (niche activities). The simultaneous occurrence and mutual reinforcement of pressures and shocks on the regime's landscape and innovative activities in its niches generate what Geels & Schot (2010) subsume as "co-evolutionary" processes. System transformation can come about through a multitude of pathways (Geels et al., 2016; Geels & Schot, 2007), as well as through interactions between different innovations and through relations between different systems (Geels, 2018).[4]

As imaginable, there has been a great variety of research conducted with the multilevel perspective, focussing on different cases and areas, different in their ontological standpoint (Geels, 2014), but all

[4] This small paragraph provides the angle from which the literature has been reviewed. The multilevel perspective is going to be introduced in more detail further on in this thesis. If you would like to take a quick look at the corresponding figure, hop on to page 12.

driven by the question of how novelties are brought into the world (and eventually alter it). Within sociotechnical research, "narration" has recently been studied as a fundamental social process in the development of sociotechnical systems, based on the conviction that all such processes begin in the human mind and its belief, imagination and root in the human necessity to connect known elements of a reality into a coherent whole in order to make sense of the world and to take decisions. Smith and Raven (2012) point out how collective narratives pave the way for innovation by empowering it to "fit and conform" or to "stretch and transform" (p. 1033) sociotechnical systems. Howarth (2017) analyses how narratives condition policy making for the case of the fifth UK carbon budget. Karhunmaa (2016) finds that storylines significantly shape the success of technologies for the example of voluntary carbon markets (2016). This notion reflects in Urhammer & Røpke's work (2013), finding that economic models are primarily structured based on narratives, which becomes especially evident in times of crises. Lukas Hermwille similarly argues for turning to narrative analysis in MLP research. In a study of the Fukushima case (2016) he shows that landscape shocks only trigger regime transformation if they cause changes within dominant discursive configurations on the regime level and translate into novel predominant narratives (p. 18). Analysing the "myth of unreliable renewables" (2016), Thomas Lee underpins the role of narratives in either driving or hindering transformation processes. Babe (2018) puts economic transformation into the perspective of how economic categories are communicated. "[D]emythologizing hegemonic doctrines of Market, Technology and Evolution" (p. 4) is, according to Babe, a useful tool to unmask naturalized economic facts as societal beliefs. Based on the power of narratives to structure reality, Bushell et al. reconstruct different strands of narratives about climate change in order to then construct a "unifying strategic narrative" (2017) with the goal of overcoming the abyss between actors arguing for and against transformative action addressing climate change.

These studies show how narratives pave the way for political decision, however, there is a need for more "in-depth empirical work" (Smith & Raven, 2012) and to move be beyond the notion of "collective narratives" when assessing the role of power in paving the way for sociotechnical transformation. While the narrative approach has simultaneously served for unmasking hegemonic systems, they leave the open question of how to move on with these insights and deliver recommendations for the concrete local and empirical case.

Thinking about 'actors', it is insightful and necessary to review how the originators of such narratives are conceptualized in the relevant literature. The concept of 'agency' in managing innovation has played an important role in sociotechnical research (Barnes, 2019; Kivimaa & Martiskainen, 2017; Loorbach 2010; 2007) and its conceptualization mostly moves in the realm of coalitions of actors and associated interests (Avelino & Wittmayer, 2016; Geels, 2014; Stirling, 2014; Paredis 2013; Reuzel et al., 2007). Just recently, more ample conceptualizations of agency, power and knowledge have been engaged in order to find out how they produce and limit cognitive terrains and condition sociotechnical pathways (Stirling, 2014). An example is a study by Upham et al., who placed their focus on epistemic factors in a study on "agents' locally situated perceptions of their contexts − their lived experience" of

technologies − and of sociotechnical processes (2018, p. 164). Opening up the epistemic black box of agency, Jasanoff and Kim (2013) have developed the concept of sociotechnical imaginaries as "powerful cultural resources that help shape social responses to innovation" (p. 190). Similar work, such as by Glynos (2011), emphasizes how 'fantasy' is an under-investigated tool "in forging a people's collective and political will" (ibid. p.66).

The literature has brought forward that the generation of knowledge on sociotechnical transition processes must be sensitive to local circumstances, pinned down by Russel and Williams (2002) as 'local embedding' and further emphasized by Raven et al. (2008), Schreuer et al. (2010) and Sengers and Raven (2015). These studies motivate research to adopt a spatial view on niche activities and several geographic studies such as those by Wolfram (2015), Bridge et al. (2013) and Lawhon & Murphy (2011), support this view. Kivimaa & Kern's work (2015) on innovation policies that pursue a mixed approach (policy mixes), also argues for a policy design that responds to the specific local circumstances in order to effectively implement transformative changes towards sustainable regimes. For the Colombian case, Balanzo Gunzman's dissertation (2016) underlines the value of different knowledge traditions for political agency at the example of Colombian farmer organisations in the role of "change agents". Similarly, Silvia Lira (2013) emphasizes how the specifics of local contexts of development call for including specific local knowledge in order to form respective strategies effectively.

Nevertheless, sustainability transformation research and especially sociotechnical research on innovation tends to show a "Western" bias (Markard et al., 2012) in the choice of their cases. While the field shows more and more interest in the role of epistemology and increasingly draws sustainability management failures back to the challenge of changing predominant power-knowledge paradigms (Stirling, 2014), most objects of analysis of the research cited above and related work barely move outside the very origin of these paradigms. The impact of imposing foreign power-knowledge configurations on territories has latest been familiar since the endings of the second world war (cf. Gunder Frank, 1966; Fanon, 1952; 1961) and has been amply analysed and debated by various scholars and thinkers, amongst whom we could mention the works by Silvia Rivera Cusicanqui (2012), Walter Mignolo (2011), Catherine Walsh (2007) or Aníbal Quijano (e.g.). The Eurocentric division of the world into North and South originates in these historic circumstances and contrasting a "Southern" example shall not be the justification for the focus on the case at stake. The division is misleading, since this epistemic 'North' can be found in the global South and vice versa (Boaventura 2016, p.17). Rather, than understanding Barrancabermeja as a place in the South, it is simply viewed as a place in this moment of modernity. Modernity, which is mainly the "coloniality of power and knowledge" (Castro-Gómez, 2010) articulates in a complexity of ways and generates as many dynamics as there are spaces it defines. So, in order to contribute a small sociotechnical insight to the understanding of global fossil-fuel dependence and innovation-driven sustainability transformation, we are going switch to an*other* realm than mainly 'Northern' or 'knowledge-based' economies.

1.3 Research question

The literature review provides three major insights this research is designed upon. The "narrative turn" in social and sociotechnical research inspired work analysing the role of narratives. The selected studies above and earlier work (Moezzi et al., 2017) argue that they deliver the foundations for sociotechnical pathways. Combined with recent work on the agency of knowledge, fantasy and imaginaries, this study understands that narratives emerge and operate both within the realm of the subjective as well as the collective, enabling its functioning as a political instrument. Thirdly, the dynamics all around such storylines are situated in and connected to a certain space and time, meaning they produce and are the product of specific places and specific moments. By opting for a narrative-analytical approach to the MLP, it identifies with Moezzi et al.'s surprise about "how little and how recently such an elementary form of human expression has been invoked in energy research, especially as a research object" (2017, p. 3). Furthermore, narrative analysis lacks empirical and ethnographic in-depth studies of local contexts. While they have been used as a point of departure for formulating transformative strategies (cf. Bushell et al., 2016), there is a lack of focus on the concrete local case. Lastly, the focus on the articulation of power in collective narratives (as in e.g. policy papers or newspaper) pays little attention to subjective narration and its potential for generating novel narratives.

Investigating how innovation is narrated in the context of Barrancabermeja, Colombia, requires putting the multi-level perspective into a slightly different angle than the structural ontology it is originally informed by (cf. Hermwille 2016, Geels, 2010). From a discourse theoretical point of view, it is not necessary to position elements of a social order on hierarchical levels. Instead, the question is how landscape events, regime elements and innovation are subjectively *articulated* as such and what consequences this has for the collective picture. The focus is therefore placed on meaning constructing subjects, people, who cover different positions within the totality of the sociotechnical system at stake, the local economy of Barrancabermeja. It thereby responds to Geels' call (2018, p. 230) for further broadening the scope of MLP research, for developing additional conceptualizations, as well as for putting the focus on "whole systems". It does so by adding discourse theory to the MLP, opening it up to the agency of subjective belief and imagination on the nature and direction of innovating a sociotechnical system. On the other hand, adding the MLP to discourse theory delivers a theoretical ground for narrative analysis, as it pushes towards the question for what language does, not primarily for what it means. It also shows that discourse theory is not that far away from practical implications as is often suggested and that narratives do have an impact on the design of policies (Howarth, 2017). Thinking about practical implications, the study also finds great motivation in contributing to the formulation and implementation of an integrated and comprehensive long-term strategy for innovation management in Colombia (Acevedo Alvarez, 2009) including an economic projection for Barrancabermeja. After having zoomed in to this local context, the study also aims at zooming out again, by reflecting on how far this research approach can help with the often-quoted problem of "paradigm

change" as a precondition for sustainability transformations worldwide. In order to arrive at these conclusions, the study asks:

RQ: *How can subjective narratives strategically project Barrancabermeja's sociotechnical regime into a sustainable post-carbon future?*

The research question builds on the considerations about the global sustainability "policy project" made so far (chapter 1.1 and 1.2) and projects them to the case of the Colombian municipality of Barrancabermeja. In other words, starting with the dilemma of an ineffective global sustainability agenda based on a modern-colonial paradigm, this thesis engages in a search for emergent futures encoded in subjective narratives about the territorial condition. It shifts the focus away from the notion of collective narratives and engages with subjective experience of a sociotechnical regime based on fossil fuels. The formulation of the question indicates its explorative character in two ways; first, the "how" indicates that this study explores modes for exploring local potentials and derive recommendations from these insights. Second, it requires a theoretical exploration of the notion of the narrative from a subjective place of enunciation and how such narratives relate to sociotechnical regimes.

Q1: *How is the territorial present and future narrated in Barrancabermeja?*

The first sub question focusses on how innovation expresses in subjective narratives about the territorial condition of Barrancabermeja. It aims to collect and depict subjective experiences of the life world of a sociotechnical regime dependent on carbon. Rather than focussing on official or press documents, the focus is put on subjects' imaginations and truths that inform what they perceive.

Q2: *What are the consequences of these findings for local innovation policymaking?*

This second question is motivated by engaging in a practical discussion of the research findings. How can subjective narratives deliver the basis not only for understanding dominant expressions of sociotechnical regimes? Again, this aspect is of explorative nature, because this question asks for the possibility of subjective narratives as a possible source for deriving local directions. Rather than engaging in a classification or typology of transition pathways, it takes a first step by analyzing possible directions for them.

1.4 Research question

The study is built as follows. It starts from a theoretical place by thinking the multilevel perspective from a Neo-Gramscian discourse theoretical perspective. Therefore, it will explain the logic of the three levels of sociotechnical regimes and afterwards connect this concept to Neo-Gramscian discourse theory. Afterwards, the notion of the narrative is going to be explored in order to deliver a theoretical definition. The final part of the theory shows how narratives relate to sociotechnical transformation and the issue of sustainability. On the one hand, this chapter serves to show that structural ontologies are somehow misleading, since structural and systemic configurations such as sociotechnical

regimes are rather an articulation subject to power as knowledge about the nature of these structures. On the other hand, it conceptualizes the notion of "the narrative" based on theoretical literature and connects it to the issue of transformation. It thereby paves the way for the methodological approach to this study, which responds to the explorative character of this study with an abductive design and secondly, which pursues the objective to find out about local subjective narratives. Followingly, the study opts to listen to people's stories. Therefore, an in-depth case-study based on a five-month fieldwork project has been designed involving the visit of relevant places, conducting semi-structured in-depth interviews as well as ethnographic fieldwork. The interview transcriptions are chosen as the main source for data analysis, the discussion is complemented by ethnographic findings and information gained throughout the fieldwork. The data has been analysed with a coding scheme that is based on the sociology of knowledge (Keller, 2008; de Sousa Santos, 2002). The methods chapter is going to explain the methods engaged for answering the research questions in more detail.

The findings, the subjective territorial narratives, are going to be presented in the analysis chapter. In order to give more structure, they will be grouped in categories. Afterwards, they are going to be discussed in terms of how landscape events and niche causes potential points of dislocation and how these can function as windows of opportunity for the constructing sustainable, non-carbon-based futures. A final chapter is going to sum up the study, answer the research questions and conclude its main outcomes. Based on this it will formulate recommendations for future research.

II. THEORETICAL FRAMEWORK

This chapter is going to theorize the sociotechnical perspective as a dominant system of meaning production, which requires putting it into an ontological perspective that slightly shifts away from its origins in structuration theory. This chapter starts with the multilevel perspective and the introduced Neo-Gramscian discourse theory. In order to deliver an understanding of the notion of the narrative, the chapter will proceed with a theoretical exploration of the narrative and bring it in connection with system transformation. A summary will point out the consequences and directions for the study.

2.1 Sociotechnical regimes from a multilevel perspective

The sociotechnical turn in social sciences puts technology into a social perspective, as without human activity, "technology has no power, does nothing." (Geels, 2015, p. 1257). This section serves as an introduction to the multilevel perspective. It has been developed by Frank Geels in order to model sociotechnical system and aims at understanding "technological transition". This means to think system-dynamics in their totality, enabling the analyst to see how "windows of opportunity" facilitate the emergence and diffusion of novel technology and innovation. Human and non-human actors, institutions and factors are structured along the three levels called landscape, regime and niche.

From the structural ontology that informs the multilevel perspective originally, the landscape level accounts for the macro-structure (Geels, 2010, p. 505) in which the sociotechnical regime is embedded. Larger-scale characteristics such as overall paradigms, political systems, market prices are accommodated on the landscape level. It comprises all factors that affect and condition the sociotechnical system but remain out of its reach and are followingly relatively slow to change. The regime level represents all that shapes the dominant character and appearance of the sociotechnical system, hence, all dominant social, political, economic, legal etc. institutions, its established material conditions such as machineries and infrastructure as well as the actors that account for these structures and patterns. Furthermore, a third level is theorized to allocate innovative activity. While the regime is theorized as incrementally innovating in terms of its dominant character, novelties are developed in "protected spaces" (Smith et al, 2012).

A sociotechnical system can similarly be seen as a dominant regime of practices which hegemonically establish meaning with the difference that the dominant regime includes "landscape" characteristics as part of the hegemonic regime. After all, the oil price or paradigms do form part of the regime as meaningful elements. Landscape shocks, which are originally referred to as regime-external changes are here understood and somewhat simplified as "events" (Howarth, 2010, p. 313), or the "raw material of the narrating interest" (Koschorke, 2012, p.62 as cited in Gadinger, 2014, p. 71), which represent elements in a network of meaning construction and have the potential to cause a shift in related practices of meaning, so that discursive elements are arranged in a novel way and new subject positions can emerge. This dislocation takes place regardless of the hierarchical position of the event, hence, on

what "level" they originate. What matters more in the context of this thesis is how subjects interpret such events and the consequence for regime dynamics.

Here again, the focus will be put on innovative activity as an element within a relational social structure. In addition to the MLP's originally evolutionary view on innovation as a "variation-selection-retention mechanism" (Geels, 2010, p. 504), it is regarded as a fundamental part of the creative human nature that improves practice, technique and materials responding to challenges faced. And on a societal level, these challenges are so-interpreted events. To illustrate this at the example of the current ecology debate, the sociotechnical regime's hegemonic narrative of economic growth, productivity and increased value, which is reflected in established institutions and vested interests, and its material dimension is largely run by fossil fuels. The growing consensus on the planets ecological systems being in a state of crisis can be understood as an event (or a row of events), which cause a dislocation within the social order, reflected in the call for transformative processes, as established meanings are detached and reinterpreted.

The hegemonic articulation of a sociotechnical system makes the innovation of technologies, practices and materials subject to power/knowledge dynamics. The MLP literature usually takes an evolutionary stance on this aspect, referring to established industry routines, market mechanisms or also cultural determinants as "selection pressure" (Smith et al., 2012, p. 1026). Protective spaces, hence, fulfil the function of shielding the developing innovation just like an adolescent species until its population is fit enough to persist in the ecosystem. A second and more active function of the spaces is that innovations can be "nurtured" through its strategic management, which can be investment, the connection of innovating actors, and so on. (ibid., p. 1029) Part of this process is the strategic empowerment of innovations, which Smith et al. (2012, p. 1030) divide into those that are "fit and conform" with the hegemonic character of the regime and thus fit to establish within its "ecosystem" and those that are able to "stretch and transform" it. Together with recent findings by e.g. Hermwille (2016), the literature shows that narratives play a crucial role for the power to trigger dislocations and windows of opportunity for sociotechnical regime transformation.

The provision, management and empowerment of innovative spaces within a social order is, as mentioned, clearly not a "selective" process within a naturally given environment of magical market mechanisms and given structures, but subject to narration (ibid., p. 1032) and a power political instrument for the hegemonic governance of innovation processes.

Hence, the project of transformative innovation towards sustainability is subject to its hegemonic interpretation. And after all, hegemony is not concerned with levels of structuration, since

> "so to say, within a heterarchic theory of power it is impossible having molar structures (the world economy, the international division of labour, the colonial exploitation of the peripheries, etc.) on the one side and molecular structures (the affected, intimacy, relations that individuals establish with themselves and others) on the other, as if they were logic and ontologically depending on the former." (Castro-Gómez, 2007, p. 167).

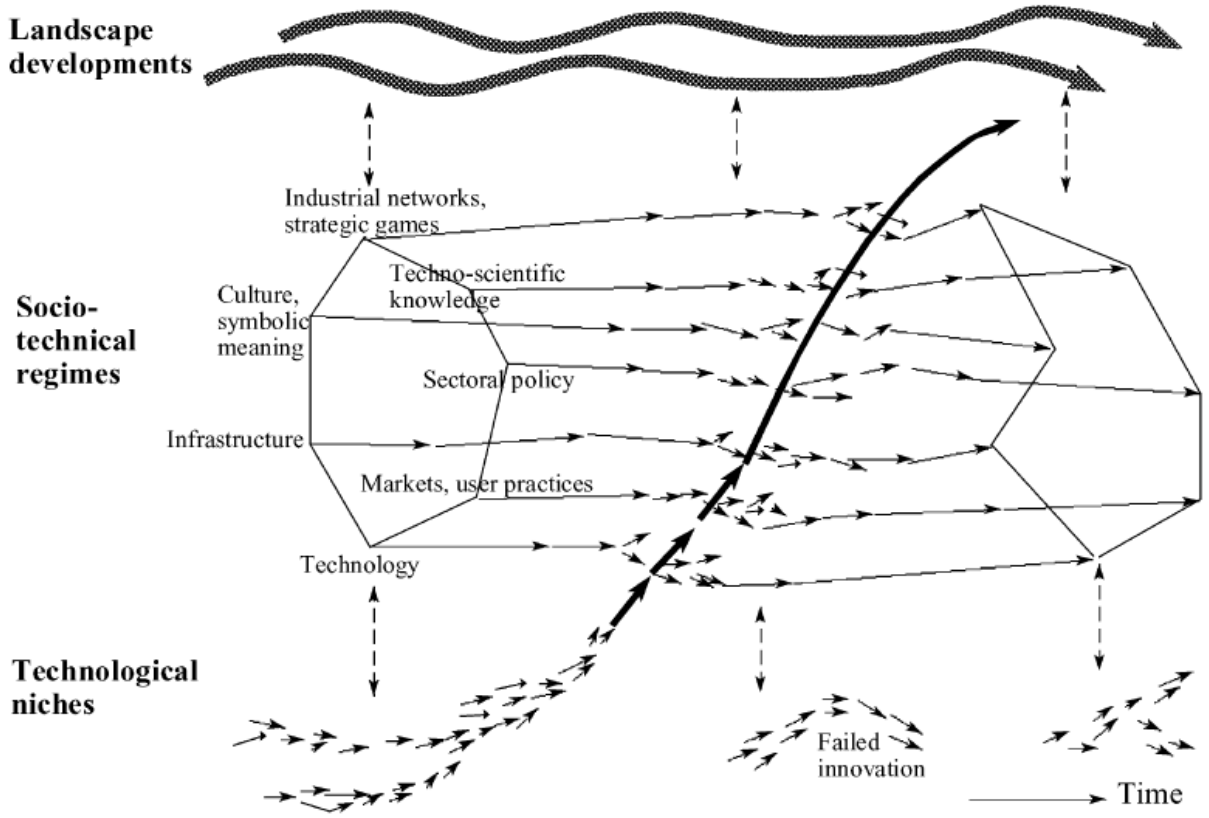

Figure 1: The sociotechnical perspective (Geels, 2015, p. 1263)

2.2 The nature of things: Discursive hegemony

The theoretical framework builds on the Neo-Gramscian perspective on social orders such as for example "the society", "the economy" the "political system", as hegemonies, which are understood as a configuration of dominant ideas, institutions and material capabilities (Cox, 1981, p. 136). Hegemony is exercised through the widespread reproduction of dominant norms and beliefs about "the nature of the order" (Herschinger, 2012, p. 69). The social reproduction of hegemony is, according to Gramsci (1971), naturalized in the form of what he termed an "invisible consent", working by means of the unconscious acceptance and appropriation of causalities, ideas and overall beliefs, which in turn inform and are supported by the institutions and material dimension of a system. The network of ideas, material capabilities and institutions, termed the "hegemonic bloc", is "historically conditioned" (Cox, 1981, p. 136), as history provides patterns of intersubjective meaning which "constitute the common ground of social discourse" (ibid.) and the framework for the interpretation of the social world.

From a post-structural perspective, the social structure is not regarded as a reciprocal constitution of ideas, things and institutions. Instead, the latter two are regarded to be the outcome of ideas. This school of thought moves beyond the essentialist view that thinking subjects (humans) encounter objects (non-humans), which possess a predefined and consistent, "fixed essence" (Howarth, 2010, p. 311; 314) and that all social action departs from its dualistic relation with this structure. Rather, the essence of

things and the relations between them are a result of articulatory practice (Laclau & Mouffe, 1985, p. 105). This does not mean, as often gets confused, that "everything *is* language" – material reality surely exists – but all signifying or meaning structures and practices" (Howarth, 2010, p. 312) are discursively constructed (Laclau & Mouffe, 1985, p. 94f.). Thus, discourse as a meaning-constructing social practice is not a form of contemplating or reflecting social structure, but the mode of directly constructing it. This perspective on social reality allows for a "considerable enlargement of the field of objectivity" and the analysis of relations that emerge within this field (Laclau & Mouffe, 1985, p. 95f.).

Hegemony is then conceived as a discursively structured totality and is considered to be reproduced through a continuous and repeating process of attributing meaning to elements, concepts, institutions and "things". Discourse accounts for a system of social practice (comparable to the notion of "social force" in Neo-Gramscian IR), that link these elements into a meaningful whole (ibid., p. 105). In line with the Neo-Gramscian concept of "consent", they represent "routinised forms of human and societal reproduction, which are material and articulatory at the same time" (Herschinger, 2012, p. 71).

Discourses are regarded as relational constructs, illustrated by Laclau and Mouffe (1985) with the metaphor of a fishing net, where all knots represent actors, or actants as a term that comprises both human and non-human actors (Callon, 2007), that articulate 'the structure' in relation to (logic of equivalence) or from (logic of difference) each other. This means that every element of a discursive totality is meaningful only in the context of all other elements. Crude oil, for example, is a substance like any other substances in or on this planet but only acquires its meaning when brought into relation with human socioeconomic activities. If it wasn't a prime energy resource, it would not be "black gold" but remain unconsidered in the ground. Besides that, another feature of discourse is its state of permanent flow in which meaning can only be temporally and contingently settled. It is continuously being fixed and refixed by thinking, experiencing subjects in relation to all other elements in the discursive totality. Meaning can only be grasped at moments, where elements are "partially fixed", because

> "if we accept […] that a discursive totality never exists in the form of a simply *given and delimited* positivity the relational logic will be incomplete and pierced by contingency. […] A no-man's land thus emerges, making the articulary practice possible." (Laclau & Mouffe, 1985, p. 97).

As long as a hegemony remains uncontested, it remains invisible, the meaning of its elements is fixed and permeates the "nature of things". It articulates and thus becomes open to transform, as counter-hegemonic voices question the natural character of the ideational cornerstones of its established system or in other words, make different sense of the same world. Its system of practice might come into question as it fails to deliver expected outcomes. Subjects might identify alternative ways of structuring social reality and put the status quo into question. Contradictions are revealed. (Cox, 1981, p.127) Then, the hegemonic system can resort to the manipulative function of the third dimension of power and integrate counter-hegemonic discursive elements into its own system of meaning, harmonize initial

polarizations and thereby preserve its supremacy. Outside of that, the hegemonic bloc can also resort to domination and coercion in order to maintain its position. The hegemonic bloc's potencies in these dimensions of power are backed by the degree of institutionalisation and materialisation of its ideational cornerstones (Cox).

The hegemonic struggle, which describes the dislocation of a discourse and the contestation of its element's meanings, is an interesting moment. Firstly, it reveals hegemony, because the certainty of its natural status quo is questioned (Howarth, 2010, p. 314) and it represents a conjunctural moment after which the hegemonic system is either weakened and might have to condone changes in the social order or strengthened through the persistence and possible reinforcement of its dominant position. And secondly, it reveals the social forces underlying a system, for example, how power expresses, how it associates material, ideational and institutional resources with different powerful subjects, how it naturalizes ideas, institutionalizes and materialization, which is where hegemony becomes a political practice (Howarth, 2010, p. 317).

The Neo-Gramscian analysis is originally concerned with the analysis of aggregations of power. (Cox, 1987, p. 127). Rather than understanding power as a deployable tool or systemic resource, Michel Foucault worked out that rather, it can be understood as a form of knowledge that discursively constitutes what we perceive as structure as well as agency and respective relations (Foucault, 1968, p. 68). There are as many discursive variations to account for "reality" as there are subject positions, yet a discourse can be considered hegemonic when it accounts for the common sense, the "normal" way of interpreting things in one way instead of the other. Hegemony is therefore a question of power as knowledge and it transcends all structure. In its shape of an invisible consent it makes subjects act according to their alleged will, following what they consider as reasonable, which relates to the third dimension of power (Lukes, 1974). Foucault emphasizes the relativity and situatedness of knowledge when stating that

> ". . . truth isn't the reward of free spirits, the child of protracted solitude; nor the privilege of those who have succeeded in liberating themselves. Truth is a thing of this world; it is produced only by virtue of multiple forms of constraint. And it induces regular effects of power. Each society has its regime of truth, its "general politics" of truth; that is, the types of discourses which it accepts and makes function as true; the mechanisms and instances which enables one to distinguish true and false statements, the means by which each is sanctioned; the techniques and procedures accorded value in the acquisition of truth; the status of those who are charged with saying what counts as true" (Foucault in Rabinow, 1984, p. 72f.)

The power over meaning construction is deeply connected to the production of knowledge, because the later sets the field of objectivity (de Sousa Santos, 2011, p. 25) which means that it disposes over which elements are located inside the scope of the certain and the possible and which ones are rendered impossible and thus remain unconsidered. When Boaventura de Sousa Santos speaks of a hegemony of scientific rationality (2009, p. 20), he refers to scientifically established facts and causalities between facts as dominating the domain of "truth", privileging them to structure reality. Today's societies, according to Boaventura, are still "protagonists and products of this new order", which had been built

with the findings of Copernicus, Galileo and Newton and "completely changed the foundations of society" (ibid., p. 19). This hegemony is characterized through the appropriation of the concept of rationality by Western science on a global scale. Although it permits internal variety, it discredits all other forms of knowledge, such as traditional knowledge, common sense or humanists as irrational and, hence, untrue. By constantly drawing the line between scientific knowledge and "non-knowledge", the hegemony of scientific knowledge works with an antagonistic logic that de Sousa Santos labels "abyssal thought", which moves as a line through the development of modernity and remains its foundation up to today (de Sousa Santos, 2007, p. 54).

2.3 The narrative

Narratives are stories with which subjects confront societal conditions, identify their origins and possible consequences, and on the basis of which they take responding political decisions (Roe, 1994). Once a political problem is fixed, each "lecture" of it will cause its "destabilization" (Arubla Sanchez et al. 2010: 321), in the sense that every "reader" is going to construct his own account to the issue. The conjunction of perspectives over a certain condition is what Roe refers to as "controversy", defined as "the absence of convergence over the definition of problems and its related causes" (ibid., p. 329). Tracing this spectrum of narratives in order to understand political processes builds on the constructivist tradition of accepting the impossibility to arrive at objective accounts to social reality and provides space for finding out about how social practices bring forth interpretations of the world and visualize the dominant modes for doing so.

There is a famous quote saying that "stories do not take place but are narrated". Ransmayr (2018) adds that "the mere recorded, documented event is mostly not a lot more than a chaotic collection of facts, raw material, which makes a narrator speak". Generally, narratives are modes of relating and differentiating elements in a subjectively logical way (Howarth, 2010, p. 312). These elements can be material appearances, events, ideas, every*thing* that is perceived. These elements are put into the context of each other and through this process create a more or less stable grid: 'the world'. The "homo narrans" (Koschorke, 2012, p. 9f.) who picks up on an element of this world ties it into different space-time configurations and arrives at a conclusive story. The narrative creates a situated continuum between the past and the present condition and derives statements about possible or necessary futures (Gu, 2012, p. 542ff.) Hence, narratives are constructed of different temporal dimensions and offer coherence between them (ibid., p. 546). There are various subtle subjective stories that narrate our own existence and enable or hinder us to act, a point that moves out of the frame towards Nietzsche's philosophy or the thoughts of Freud, Jung and Lacan on psychoanalysis. But in political terms, the myth and the individual and collective unconscious play a similar role. The narrative transcends not only issues of time and space but serves to cross "all dichotomy that inserts itself between the real and the fictional, between myth and logos" (Gadinger, 2014, p. 70).

Imagination, myth and fantasy are therefore considerable tools to bridge certainty and uncertainty and are considerable hegemonic tools insofar, as "relevant to historical structure are collective images of social order held by different groups of people" (Cox, 1987, p. 136). Across their timely expressions, narratives are constructed in an imaginative mode and the myth as a specific understanding of 'the past' has been an important tool to deploy history for structuring the present in a desired fashion (e.g. Dalsheim, 2007). The notion of the "historic bloc" hints at the possibility to trace hegemonic networks of institutions, ideas and material capabilities back in time (Dalsheim, 2007, p. 521). The historic consolidation of these dimensions can have a deterministic character on judgements about present conditions and their future potential, which reflects in narratives of systematic lock-ins or path dependencies (Unruh, 2000). In this case, the narrative would be structured by the perspective that in face of the persistent character of a system over history, contemporary structures are hardly changeable in the future (Gudynas, 2011, p. 390).

Jasanoff and Kim (2009, p. 120) turn this aspect around by working out, how so-called sociotechnical imaginaries as "collectively imagined forms of social life and social order" are narratives that possess the power to direct political decision-making of sociotechnical systems and thus become "reflected in the design and fulfilment of nation-specific scientific and/ or technological projects" (Jasanoff & Kim, 2009, p. 120). Here, it is not history that is subject to present-day policy making, but the political agenda, investment flows and the conduction of respective projects, the present, which is subject to a specific imaginative narrative of the society's future. At the same time, future narratives of what can or should be, or what is unthinkable of happening, are tied in with "the past" as a point of reference and present narratives, since "situated presencing advances in response to human intentionality (including the motive, desire, wish, affect, etc.)", generating the sense of a specific incoming future (Gu, 2012, p. 546).

We are again getting very close to the human psyche, when thinking about how narratives express and carry "fantasy". Žižek (1998) shows how in a sociological sense, it is a simple procedure by which everyday activities are reasoned with a desired "fullness-to-come once a named or implied obstacle is overcome, and which foretells of disaster if the obstacle proves insurmountable" (Howarth, 2010, p. 322). Fantasies are a discursive instrument that legitimize present activities for the sake of a phantasmic future narrative, for example, economic and social development and territorial productivity backed by the dependence on fossil resource extraction, revealing the "beatific" side of fantasy, or its "horrific" side, where the absence of the phantasmic image, the economic crises that would go along with an alternative basis for the local economy, is a threat to the stabilized order. Crises do not only disrupt systems but by showing what happens when the status quo turns into a state of crisis; they become a narrated political instrument that helps consolidating the status quo with a phantasmic necessity to secure a smooth continual of activities.

A discursive crisis is, as shown earlier, the expression of hegemonic struggle, a time of "dislocation", where fixed meanings are contested, and the discursive totality gets into rotation. It is a

moment, where established truths are questioned. Common fantasies might become visible and shattered. In these moments, the narrative process functions for grasping societal problems and thereby reduce complexity (Gadinger, 2014, p. 68). Collective narratives are of political relevance in order to arrive at responding solutions. Nevertheless, one can certainly not speak of *the* narrative, rather, about a range of subject positions within discursive fields, and "to each such perspective the enveloping world raises a number of issues; the pressures of social reality present themselves to consciousness as problems" (Cox, 1987, p. 128). For the narration of problems and thinkable solutions a 'collective narrative' represents what is subjectively perceived as "subliminal articulation of collective certainties" (Gadinger, 2014, p.68), as relational patterns of interpretation that can function as the basis for subjective narration (Hermville, 2015, p. 4). Subjective narratives are the point of departure for the (re)production of imaginaries, that do not solely function as a medium for social interaction but are constitutive for public decision making.

The logic that regulates the production of knowledge sets the limits for what is regarded as possible and viable, such as for the unworkable and irrational. Therein, certainties and uncertainties about the societal condition are brought to expression and simultaneously, collective and subjective knowledge are tied into a frame of action and a political agenda (ibid; de Sousa Santos, 2009, p. 23).

While the focus on common meaning encoded in language informs the general focus on discourse, the narrative as a specific category of discourse analysis serves to shift the focus to "what language and speech does than what it means or presupposes" (Hermville, 2015, p. 4). Narrative policy analysis therefore engages with "phenomena in discourse" (Urhammer & Røpke, 2013, p. 64 as cited in Hermville, 2015, p. 5), which enlightens the understanding of political process dynamics. Tracing narratives then requires conceptualizing the "homo narrans" (Koschorke, 2012, p. 9f.) as 'subject'. Here, we can remember Laclau & Mouffe (1985, p. 107; 121) and recognize that "every subject position is a discursive position", which amplifies the notion of "actor" from tying it in with supposed rules of action towards a more fragmented spectrum of agency, created as an element in the discursive totality, as "places of enunciation" (Howarth, 2010, p.314). While the "actor", from a structuralist perspective, stands in a dualistic relation with social structures, such as macro-structures, cultural deep structures or similar (cf. Stones, 2005; Giddens, 1979), the conceptualization of "subjects" integrates the rules associated with their place of enunciation with the subjectivity of the individual it is covered by and thereby substantially revaluates the "practical and critical competences of *ordinary actors*" (Boltanski, 2010, p. 50-56 as cited by Gadinger, 2014, p. 78). Furthermore, this conceptualization responds to the fragmented position of the subject in a space which is not only functionally structured but grasped as a space for meaning creation beyond systemic rules and limits (ibid., p. 77f.).

2.2.1 The narrative and transformation

Within the academic discourse, societal transformation has been associated with "social change" as change in social institutions foundational for a social order, such as family or marriage (Reißig, 2014).

Furthermore, it has been associated with revolutions as a certain type of social change that implies a sudden break with the old social order and which brings about the establishment of new political, cultural, economic, etc. relations (Scokpol, 1978). Transition has been understood as a directed process, a shift of political or institutional orders by a set of specific actors in charge of these institutions. It has been frequently used for describing the reorientation phase after ruptures in political and institutional contexts, such as the collapse of the Soviet Union or the independence of colonized territories. (Reißig, 2014, p. 1) The definition of the term "transition" by the sociotechnical perspective as a "nonlinear shift from one dynamic equilibrium to another" (Loorbach, Frantzeskaki & Avelino, 2017). "Sustainability transitions", which are defined as such transitions that are "large-scale" in character and "are deemed necessary to solve "grand challenges" (ibid.).

The notion of transformation is employed for social processes that trigger changes across different spheres. Accordingly, transformation does not only reach deep but wide. It accounts for a longer period of time and can be regarded as the sum of smaller processes of change. Transformations are driven by politically defined objectives pursued by dedicated actors and at the same time, evoke unintentional, unanticipated developments including respective searching and learning processes (Reißig 2014, Leggewie & Messner, 2012, p. 4-6). After an initiating moment, transformation processes do not necessarily follow a continuous order but deploy in different speeds, stepwise, interruptedly or incrementally (ibid). French history scholars such as Bloch or Braudel coined the term 'longue durée' for longer transformations that comprise small step changes and conjunctural moments. Commonly debated examples of "grand" or "global" transformations are the Neolithic Revolution and the Industrial Revolution with the following emergence of modernity (Buzan & Laws, 2015, Castro-Gómez, 2010). These spheres are separable mostly on the basis of their respective "socio-metabolic regimes" (Haberl et al, 2011) hence, the way in which human societies generated the energy required to live. With regard of the impossibility for industrial societies to sustain on the long-run, humanity finds itself in the strange situation of a grand transformation that is both anticipated and crucial to survive.

As mentioned in the introduction, the sustainability debate brought the narrative of *transformation* back into fashion, because the criticism and concern about the externalities of our economic model was not new. One of the first to mention the dilemma of the idea of progress and growth using resources was Thomas Robert Malthus, who in his "essay on the principles of population" (1789) pointed out that a geometrically growing human population with an arithmetically growing food production could only result in famine and disaster. Equally, utilitarian Jon Stuart Mill quickly realized that the creation of wealth must be regarded separately to the accumulation of material value and in regard of the increasing destruction of the environment, favouring a stationary state of everlasting growth. Later, Gerrit Hardin (1968) famously introduced to the "tragedy of the commons", which problematizes Adam Smith's idea of the common benefit arising from individual economic liberty. Contrasting the common good with individual will, Hardin concludes that "freedom in the commons brings ruin to all".

Despite these earlier concerns, the prospect of flourishing civil societies by growing material wealth was all too promising, and the hegemonic conviction remained that genuine progress lies in economic and technological advance. So, the novelty brought about by the sustainability discourse is not its substantive basis (the environmentalist criticism) but its systemization and call for profound societal transformation (cf. Meadows, 1972). The concerns about resource use formulated in this discourse went beyond the simple question of providing livelihood for growing societies and preserving the commons towards worries about their complete depletion, facing ridiculous levels of consumption and of disposal of products made of unrenewable resources. Negative externalities, it was feared, could outnumber the positive, which would create a disastrous "uneconomic growth" (Daly, 2007, p. 12). Furthermore, the sustainability discourse applied not only to the environmental realm but nurtured the critique of our neoliberal economic model for generating states of economic crises and fostering social inequalities (Wanner, 2015, p. 23).

The green awakening of the masses and the respective transformation narrative taken over by the historic bloc had soon been debunked by various contemporary observers. While communicating the possibility of harmonizing resource-driven growth with ecological and social values, responsible actors and decision-makers rarely implemented progressive measures towards that. Hence, a sustainable transformation, which continues to rely on hegemonic parameters, such as economic growth, competition or scientific and technological progress, which is perpetually brought forward by the same institutional agents and pursues the same ideational goals, could not be more than a myth.

Esteva (1992), for example, describes the historical genesis of the term "development" as a fundamental tool of Western hegemony and points out how sustainability is an attribute that informs the "strategy for sustaining 'development', not for supporting the flourishing and enduring of an infinitely diverse natural and social life" (p. 13). This could be experienced by the appropriation of the sustainability concept by the neoliberal turn of the economic model promoted by the World Bank (Escobar, 2007, p. 164), which instrumentalized the environment (as well as the woman and the small peasant) for an alleged crisis and change discourse, which in fact remains within and strengthens the discursive boundaries of the hegemonic development discourse (ibid.: p. 265; p.323ff.). Sustainability is then an "empty signifier", which strategically integrates counter-hegemonic discursive elements into the dominant discourse or in other words, an intrinsically meaningless catchword that serves as a blank space that fits radical environmental action and conventional economic activities alike and rules out all threatening contradiction.

Grosfoguel (2016) worded this quite explicitly, when subsuming that "imperial/colonial/capitalist/patriarchal societies are unsustainable, because they live on robbing and destructing everything else (human and non-human)" (p. 139). According to him, this extractivist logic lies at the heart of the paradigmatic issue. Contemporary projects in which the idea of sustainability is claimed to stand as an objective are mostly not sustainable but in fact remain greened conventional

extractivist undertakings, as for example neo-extractivist economic activities (Ulloa and Coronado 2016; Seoane, Taddei and Algranati 2013; Acosta 2011; Gudynas 2010) and generally for unrenewable resource-based growth-led operations. From a further perspective, the concept of sustainability as a novel societal paradigm established by the Western-dominated global community has been framed as another myth in itself. Considering the relation that so-called native societies have been keeping up with their territories for thousands of years, the alleged novelty of the idea of finding ways in which to not destroy the planet by inhabiting it clearly belongs into the realm of "epistemic extractivism", according to Betasamosake Simpson (2013).

A transformation that is aimed at resolving contemporary environmental and societal challenges must, according to this point of view, go beyond green growth and sustainability vocabulary, which more and more settles in Western minds, too (cf. Reißig, 2014). It shall, for example, establish local identities that depart from the logic of colonization and reconnect to territorial historic narratives (Rivera Cusicanqui, 2010; 2008) or "humanize" sociotechnical transitions (Jenkins, 2018). For Enrique Leff (2010), "the environmental crisis is a product of knowledge" (p. 89) and more precisely, of the domination over the domain of the rational and over the construction of valid truth by Western scientific knowledge. In similar terms, de Sousa Santos (2012; 2009) argues for the creation of an ecology of knowledge in order to overcome the hegemonically structured social order that is founded on "abyssal lines of thought", which structure modern societies In order to attain profound transformations, an emergent paradigm (ibid., p. 40) would have to seek to overcome abyssal, differential logics of meaning construction by identifying its limits, a process which is also a result of the knowledge it created about itself (ibid., p. 31).

2.4 Summary

The sociotechnical notion of dominant regimes which are dislocated by innovations and "external" events, has been embedded into a more explicit notion of hegemony building on Neo-Gramscian school of thought and responding insights about social order as discursive totalities[L1]. Their meaning is subject to articulation, to the establishment of relations between the totality of its elements and to a continuous process of establishing and rethinking social meaning, a contingency. In this articulatory process, landscape shocks as discursive events play a crucial role, as they represent a window of opportunity for the reallocation of social meaning, which informs the way in which sociotechnical regimes are structured.

The "narrative" has been theorized as a subjective account to the social order, which creates a continuum between points in time and creates connections between the certain and uncertain on the basis of knowledge and imagination. On the basis of this story, subjects arrive at a definition of problems and thinkable solutions, which offer orientation for taking decisions. The nexus of power and knowledge determines dominant narratives that inform sociotechnical regimes and possible pathways, which turns it into a point of departure for reconstructing and expanding the spectrum of narratives, the

“controversy”. While societal transformation has been regarded as a long-term phenomenon of incremental steps and often been object of historical analysis, the sustainability transformation is partly defined by a call for taking active measures for it. Simultaneously, it is a project that is marked by controversy and a lack of imagination about its implementation.

In combination, this leads to the conclusion that subjective and local narratives play a crucial role in providing the paradigms for future pathways. In turn, the subjective narration is subject to knowledge and belief. In combination with the local context, it is expected that the hegemonic articulation of the sociotechnical regime at stake is subject to past experiences and power-knowledge dynamics.

III. RESEARCH METHODS

This master thesis research is embedded into an ongoing PhD-research project that seeks to compare two Colombian cases of economic dependence on unrenewable resource extraction with the aim to develop heuristics for developing transformative innovation policy. The thesis emerges from a five-months-stay in Barrancabermeja in 2018 that was dedicated to the organization of investigative fieldwork as well as a workshop with local actors in order to anticipate transformative projects to be funded by the national royalty fund for science, technology and innovation. The research is led by PhD candidate Ernesto Andrade Sastoque and supported by the Colombian Administrative Department for Science, Technology and Innovation (Colciencias), the Centre for Special Research Projects (CIPE) of the Universidad Externado de Colombia, as well as the Department for Science, Technology and Policy Studies of the University of Twente in the Netherlands. As Robert Cox pinpoints, "There is […] no such thing as theory in itself, divorced from a standpoint in time and space" (1981, p. 128), so the circumstances of the research offered the opportunity to design and conduct this in-depth case study and allow to enter a local context of the global political agenda of sustainably transforming sociotechnical systems towards a post-carbon era.

This chapter will start with a short reflection on the case of this study, the sociotechnical regime of the Colombian city Barrancabermeja. After that, the method of data collection will be outlined, and the resulting dataset is going to be described. Following that, the method of data collection is going to be thematized. This section will lay down in detail the steps conducted in order to answer the research questions as well as the methodological tools deployed. A short paragraph will reflect on advantages and disadvantages of the research design, including the challenges the research was confronted with.

3.1 Case selection

As indicated above, investigating the specific case of Barrancabermeja resulted from a collaboration in a PhD research project in Colombia, which investigates hermeneutics of transformative policy making on the basis of sociotechnical imaginaries. For the specific topic of this thesis, Barrancabermeja represents a truly relevant case. First of all, it is highly exemplary for our global dependence on fossil fuels, not only in terms of the consumption of fossil resources for the use of plastics, transportation and similar, but in terms of its exploration, production refining and transportation. The exploration fields De Mares, La Cira Infantas and further sites at the Magdalena River amounted to a daily production of around 52.860 barrels of crude oil in 2018, which is around 60% of the entire national oil production (Ecopetrol, 2015). The concessions are held by Ecopetrol, a partly state-owned (80%) and partly private (20%) multinational corporation. The refinery, whose 254-hectare large operation site is situated next to the river basin has been refining around 227.000 barrels of oil per day in 2014 (Ecopetrol, 2015) with a conversion of over 80% (Ecopetrol, 2014). A modernization project had been set up in 2007 with an

investment volume of US$ 5 billion has not been completed up to this date. Ecopetrol brought the global petroleum price drop of 2014 forward as a reason for the failure of the project. This circumstance, however, severed the local crisis following this shift in the global market: the real estate sector alone had invested US$1 million in the building of hotels and apartments based on local expectations connected to the modernization of the economic infrastructure (El Tiempo, 2017). In 2016, the project was officially paused (El Heraldo, 2016). Current president Duque announced to make further investments in order to proceed with the works. A further aspect is the transportation of crude oil and fuel. While the extraction machinery is connected to tubes that deliver the exploited crude oil first to stations that separate gas and sand from the material and then to the refinery[5], the refined product travels along terrestrial roads as well as the Magdalena River to the northern ports of Barranquilla and Cartagena, from where they are shipped into various global destinations.

In order to understand Barrancabermeja's present, a look into its past is useful, in which transformations have repeatedly played their role. The regional history is "one of the most interesting and multifaceted of Colombia" (González Torres, 2013, p. 13). Despite this, there exists little historic research, partly due to political circumstances and partly due to a lack of investment in investigation (ibid.). For at least 4000 years, as traces suggest, Barrancabermeja's territory was inhabited by fishermen and hunters. The Yareguíes provided their livelihood according to shamanic knowledge practices (Velásquez-Rodríguez & Castillo León, 2011, p. 37), which guided order and rulership as well as the cycles for agricultural production. This so-called Pre-Columbian period ends with Diego Hernández de Gallegos putting his feet on the grounds of the Yareguíes' region in 1536. The declaration of the red earths as Spanish property by Don Gonzalo Jiménez de Quesada, leader of the Spanish exploration, ignited the transformation of belief, productive activity and administration in the territory. The extraction and exportation of forestall products such as cinchona, caoutchouc and tagua on the one hand and the territory's logistically propitious geographic location on the other hand integrated the territory into the commencing global system of trade capitalism. The building of transport infrastructure between locations in Santander and the Magdalena River, over which the goods found their way out of the country, conducted to a period of regional prosperity. Not for the Yareguíes, however, who found themselves in times of an increasingly severe existential struggle, a battle they finally lost with the last great territorial transformation at the turn of the previous century. (González Torres, 2013, p. 17-49; Velásquez Rodríguez & Castillo León, 2011, p. 195ff.)

This transformation period began with the rediscovery of crude oil. Meanwhile regional commercial activities had significantly dropped due to the world war, José Joaquín Bohórquez stumbled across the sticky black natural resource close to Las Infantas while searching for caoutchouc (González Torres, 2013, p. 31). Based on the drastic change of the meaning of crude oil for the world economy, Roberto

[5] Outside of the territory there is a huge network of tubes and oleoducts https://www.portafolio.co/economia/asi-se-tejio-la-red-para-el-transporte-de-petroleo-en-el-pais-515353 that store the crude oil before being delivered to the refinery

de Mares, who attained concessions of the lands, decided to attract investment in the United States in order to initiate industrial operations. In 1916, the Rockerfeller-owned Tropical Oil Company started the construction of industry and extraction infrastructure around "Las Infantas" (ibid., p. 35). Two years later, the Yareguíes' population had been reduced to only 40 individuals, of which a few even participated in building the company infrastructure, as image sources suggest. The shift of the region's value from forestall value to mineral value (ibid., p. 31) "unleashed significant socioeconomic and cultural changes" (Richani, 2005, p. 116f.) such as the industrialization of the territory. The demand for labour and wages three times as high as in subsistence agriculture (ibid., p. 117), initiated a working migration from all over the country, especially uprooting peasants from the Colombian North Coast. And with the growth of a working population in a context of precarious working conditions, the first upheaval took place even before actual petroleum extraction started. The workers union *Union Sindical Obrera* (USO) established as a response and grew to become the first and most powerful worker's defence organization countrywide, proving space for the organization of worker's interests and human rights defence in a labour sector that paradoxically is one of the most lucrative but unstable at the same time (ibid.). The establishment of a working population and the beginning civil war created social pressures that local citizens responded to with the building of a strong culture of organizations and movements for defending and protecting human rights (van Isschot, 2015). Throughout the upcoming decades, Barrancabermeja staged some of the most violent confrontations of the Colombian civil war, being the target of various war parties and interests, as well as suffering the effects of an interdependent net of colonial land policy, rent and tax administration and war financing, also known under the term 'war system' (Richani, 2005).

The global sustainability transformation enters Barrancabermeja at turbulent times. With the neoliberal reforming process of the 1990s, the territory experienced increased pressures in a manifold of ways, especially in terms of opposed interests of labour unions exerting increased tension on the labour sector and in terms of paramilitary terror exercised on local inhabitants (Gill, 2009). Within the same decade, the Colombian government committed to the principles of sustainable development and issued Law 99, which sets up a decentralized institutional landscape for managing and protecting natural resources to the social, economic and environmental benefit. The early 2000, however, saw a sharp increase in the extraction of natural resources, becoming "the centre of its economic growth" (Bustos, 2018, p. 41). This development goes along with a weakening of responsible environmental authorities. After a governmental shift in 2004, the environmental licenses have doubled in the region of the Magdalena Medio. As mentioned in the introduction, the contemporarily planned non-conventional exploitation of natural gas especially will unfold further conflicts with the country's commitment to the global sustainability agenda. The impact of the petroleum industry that the city has been growing around for the past century turns respective transformations into a complex challenge. The water plains, the Magdalena River as well as the forest areas in and around the municipality's territory drastically changed

throughout this time. Examples are the contamination of bodies of water with chemicals from the petroleum industry as well as from waste disposal, the negative impact on the quality of soil and the deforestation of surrounding woodlands, which has been impacting the health of both human and non-human inhabitants.

Other than that, power/knowledge political struggles continue to define the territory today. The loss of a huge body of ancestral knowledge with the extinction of the Yareguíes as well as the coloniality of modern thinking is no thing of the past, as the persistent existential struggle of artisanal fishers and traditional farmers illustrate. And this equally affects the working and employed population; enduring extreme and changing working conditions, e.g. marked by temporary employment, relatively low levels of social welfare, high levels of unemployment and a narrow labour market, translating into an atmosphere of economic insecurity, mistrust and mental health issues, with alarming levels of depression and suicide (Vanguardia, 2017). But not only human existences are put under pressure by economic activities and political decisions, as cases of death in the manatee and fish populations highlight (Corporación Autonoma Regional de Santander, 2019).

A fracking pilot project which has been set up in October 2018 to take place in 2019 aims at initiating the exploitation of an estimated of 2 to 7 billion barrels of oil, which would triple the country's reserves of currently 1,78 barrels in the near future. According to Felipe Bayon, president of Ecopetrol, the upcoming process of licencing would have to be executed in conversation with the affected communities in order to address the "myths" that existed over fracking technology in the country. "More pedagogy" from the side of Ecopetrol would be necessary to enter a process of dialogue at the community level (Acosta, 2018). Furthermore, he emphasized that the preoccupation about the quality of water was shared by Ecopetrol and at all times prioritized over extractive activities (El Heraldo, 2018). Already towards the end of the past electoral period, the government had moved ahead with fracking concessions to multinational companies like Exxon Mobil, ConocoPhillips and Drummond (MacMillen Voskoboynik & Ordonez Munoz, 2017) that unleashed hegemonic struggles and dislocation in local economies countrywide, such as in Barrancabermeja.

Lately, however, two multinational companies were denied the environmental licence by responsible regional authorities due to "scientific uncertainties" about environmental impacts of the operations (El Espectador 2018). The political opposition, which is mainly driven by societal actors like the Colombian Alliance Fracking Free as an umbrella organization consisting of 34 regional civil society organizations, supports this decision. Their political position ties in with a wider interregional water defence movement that has been seeking transparency, justice and participation in the decision about economic operations that affect the quality of water supply. Apart from that, corruption indicators (ITEP,

2014) and the experience with local royalty-funded projects[6] underpin a wider concern for the just redistribution of the benefits and consequences of such industrial activities. Recent oil spill incidents illustrate the lack of accountability of responsible actors. (Vanguardia 2018; El Espectador 2018).

Not least, conflicts of land-use and territorial futures have, since the conclusion of the peace treaties alone, brought about roughly 150 assassinations of social leaders countrywide, of which 80-90% went unpunished. The Americas Director of Amnesty International announced that "Since President Iván Duque took office, the number of reports of threats and attacks that these defenders report to our organization has increased exponentially" (Guevara-Rosas, 2018). A recent attack on a fracking-opponent in an affected community in the Magdalena territory shows how publicly debating political and economic decisions can become a death-threatening activity (Rosado, 2019). In this opaque context, it is particularly easy for multinational companies to "apply tactics of manipulation, disinformation and division" (The Democracy Center, 2017).

Colombia's political elite frames the pursuit of fracking as an existential necessity in terms of the country's macroeconomic dependency on fossil resources and an opportunity to generate national tax and royalty income (ACP, 2018). In May 2019, the Colombian congresses approved fracking in Colombia. This decision explicitly contradicts the electoral program of the present government[7], it contradicts the long-term financial risk of significantly overinvesting in oil and gas (UNFCCC, 2018), it contradicts the government's contractual commitment within the framework of the global climate and sustainable development regime and it ignores concerns by national congress members (Colombian Congress 2018) as well as local citizens (El Tiempo, 2018) in regard of the vulnerability of the Magdalena Medio region. Overall, this political decision strengthens the general climate uncertainty and opacity in Barrancabermeja. In this very context, this study seeks to analzye this discursive struggle and collect trace local economic alternatives in subjective narratives about the present and future.

3.2 Method of data collection

The collection of these narratives starts off with the identification of relevant subject positions. This poses the challenge to determine, how we define and identify these positions. Based on the theoretical standpoint of this study, every subject position that perceives and articulates Barrancabermeja's reality accounts as a valid source of information. Furthermore, this is justified by the integration of as many "levels of theorizing" within an attempt to build foundations for political strategies and anticipation (Ulli-Beer et al., 2017). Once this ontological precondition is established, the choice of interview partners must be made because technically, not all possible participants can be included. In order to

[6] https://www.vanguardia.com/santander/barrancabermeja/santander-se-rajo-en-la-ejecucion-de-regalias-planeacion-nacional-DEVL346072

[7] With reference to Colombia's rich ecosystems and the need to preserve them, Ivan Duque emphasized that "in Colombia, there will be no fracking" during his electoral race in Bucaramanga, the capital of Santander in spring 2018. https://www.youtube.com/watch?v=0BKeGmANiP0

represent a variety of places of enunciation, a list of possibly relevant sectors and positions was prepared, covering political institutions, economic and private actors, civil society organizations, producers of knowledge such as research institutes, universities and schools, representatives of knowledge communities such as fishermen's associations and farmer's organizations and entrepreneurs as innovatively active community members, bypassing including a variety of expertise (Turner, 2001). The resulting list of contacts was revised in collaboration with trusted contacts in the research field (Restrepo, 2011, p.4). Then, the possible participants were contacted personally or by phone in order to establish first contact, introduce the research project and, given their interest, agree on an appointment for the conduction of an interview. While most contacts showed interest in participating in the study, receiving response from others was a bit more difficult, due to situational obstacles and the disposition to share topic-related information. 26 participants agreed to participate by giving an interview, 2 cancelled due to a full schedule and 3 actors were not accessible due to security reasons and 5 cancelled, 5 did not respond and 2 actors refused to share any sort of information for academic purposes.

The data collection was also guided by the snowballing technique. After the termination of every interview, the participant was asked to recommend further interview partners based on his consideration and territorial experiences. This approach resulted in a comprehensive pool of contacts, which comprised regional non-governmental and governmental organizations, involved civil society actors, private actors and municipal officials.

The semi-structured in-depth interviews were constructed based on analytical categories derived from the theoretical approach, as is explained in more detail in the following section. The semi-structured in-depth interview represents the main mode of data collection. The questions were structured in thematic blocs and served as a guideline for the interview, were the idea was to establish a conversation with the participant in which the thematic cornerstones presented above appear according to the flow of the situation. After the introduction to the research project, the participant was asked to shortly introduce her position and function in the municipality, describing the momentary situation his or her work is embedded in as well as the opportunities and challenges his or her work faces. Furthermore, the interviewee was asked about the general characteristics that describe the present condition of Barrancabermeja, and the future of his or her work within this configuration. The second bloc of questions begins with the participant's association with or definition of "sustainability", "transformation" and "innovation". After that, his or her account on national innovation policy and local innovation activities was inquired. The third thematic bloc dealt with the issue of function, production and potential of different types of knowledge and aims at finding out, what type of knowledge is considered relevant for the participant's work, how it is derived/ produced and what other forms of knowledge are identified and valued. The last bloc of questions invites the participant to reflect on desirable territorial futures and on the minimum conditions that would have to be met in order to arrive at this type of future. While the basic structure of the interview remained the same, some questions have been added or left out within the research process.

While the pool of interviews serves as the basis for analysis in this thesis, it is important to mention that the findings are complemented by the observations and impressions gained by staying in the field of research. This aspect of the research design had been prepared by reviewing ethnographic research methods (Restrepo, 2011; Marcus, 1995). A field diary served for the collection of impressions gained by the researcher's experience of the territory. The interpretation of this "data" had to respond to the general issue of how "reality" can be perceived in the framework of social research. First, the observer herself forms part of the observed, so that the idea of the observation of social reality as an object is completely misleading in the first place. In order to overcome the bias of altering findings by the very act of observation associated with deducing theses on observations from preselected theories or the induction of hypotheses based on the empirically observed, the process of field observation followed an abductive approach (Fann, 2012; Magnani, 2011). This meant that impressions were collected, and assumptions drawn, which were constantly reflected on the basis of new observations and assumptions. This technique of interpreting the research setting responds both to the recurring dilemma of observation and researcher's position as well as to the non-linearity of a research process, which evolves with the process of research activities and requires a constant exercise of rethinking the relation between theoretical approaches and social reality, empirical insights and research objectives.

The dataset comprises 26,8 hours of recorded conversation from 30 interviews with 26 interview partners, of which 27 interviews were integrated in the detailed analysis by cyclical coding. The participants are going to be anonymised by referring to them as participant A-Z. Passages from the field diary, which consists of notes from daily conversations and visits in the field such as extraction sites are going to be referred to as F. Over the course of the past months, the persecution and threatening of local citizens for the mere expression of political opinion, for the debating of social, environmental and health impacts of industrial activities or for the reporting of unlawful governmental action has increased. It is not likely but possible that the information given in the interviews is going to trigger events like that. In order to prevent any harm to the participants of this study, however, there will be no indication about the participants' personal details. The sectors their position forms part of is only indicated if necessary.

3.3 Method of data analysis: Narrative analysis

As shown in the theory section, the understanding of "meaning encoded in language" (Hermville 2016, p. 4) with a specific focus on the articulation of social phenomena suggests an analysis of how they are articulated through subjective narratives. The investigation into dominant modes of producing realities, especially based on the work of Boaventura de Sousa Santos offers different approaches. While an analysis of the "abyssal lines" of thought in the context of Barrancabermeja would have been equally interesting, this study opts for the sociology of absence and emergence for two main reasons: First, the objective of the study is to expand the objective basis for transformative policy making and secondly, it serves better to analyse the present in order to expand our perspective on it.

The method of data analysis is therefore based on a sociology of knowledge approach to discourse (Keller, 2008) as well as the narrative analysis approach (Cano Blandón, 2010), and more precisely, follows the logic of de Sousa Santos "sociology of absence and emergence (de Sousa Santos, 2002), which requires to dive into patterns defining the discursive field of transformation and into the types of knowledge that inform it. As shown above, the discursive totality is an imperfect moment, and the hegemonic struggle, referring to the attempt of meaning fixation, and the constant process in which subjects generate their "perspective on perspectives" (Cox, 1981, p. 128). So, the aim is to reconstruct these perspectives in a spectrum of narratives, the stories and non-stories that build the controversy all around the phenomenon of transformation. On the basis of this spectrum, Roe suggests constructing a meta-narrative in order to visualize common concern, demands, visions and suggestions and to illustrate diverging positions and polarizations. In order to understand the content of narratives, the analysis build on Keller's sociology of knowledge approach to discourses, which pays special attention to interpretative patterns that surge from everyday life and the commonly "known" (Keller, 2008, p. 23). Besides facts that are engaged in the interpretation of "transformation", classifications show how subjects process and order perceived realities and use the classifications to communicate them (ibid., p. 85).

A) Operationalization: Analytical categories and coding scheme

In order to guide the "reading" of the data set, the theoretical perspective has to be operationalized. First of all, analytical categories have been defined that inform the data collection process in terms of firstly, the abduction of information fieldwork observation and secondly, the formulation of interview questions.

Present territorial condition

The first analytical category refers to the subjective articulation of the discursive totality the participant forms part of. "Barrancabermeja" is the term that shall account for the network of elements that forms the totality that is referred to. It is of interest here, how the participants describe her/his position and what nodal points are engaged to characterize this totality. The participant is encouraged to formulate opportunities, challenges, risks and indicate in this regard, what is considered the future of his/her work in the territory. Then, the participant is asked to mention the elements his/ her position is related to or not related to and to describe the multitude of actors (social groups, biodiversity, important actors) within the territory. This part is presented to the participant as the entrance to our conversation and in order to put the researcher into context and inform him about, well, the "nature of things" as they are at the moment.

Interpretation of science, technology and innovation

In order to enter the thematic cornerstones of the conversation and clarify concepts, the participant is asked to define the terms “transformation”, “innovation” and “sustainability” as concisely as possible. This does not only offer an understanding about how the participants interprets these keywords, but also invited him/her to reflect on them.

Local innovation

This analytical category aims at involving the participant into a conversation about the territorial context of innovation. It starts by talking about the national policy of investing 10% of royalty income into projects of Science, Technology and Innovation in the shape that the participant is asked what he thinks is the purpose or idea that lies behind. It then goes on to reflecting on local activities of innovation. Does the participant know of any innovative projects that have been financed with these resources? How could such processes be improved and where exactly can we find potential in the local context for innovation? To what extent is the participant in the activities of his/her position oriented towards innovation? These questions are supposed to guide the conversation to reflect about processes of contestation and rearticulating. Furthermore, the term transformation is not actively mentioned in order to see, where the participant relates to it himself/herself.

Knowledge

This analytical category informs a block of questions, that tries to find out what type of knowledge the participant considers important to carry out his/her work, how this knowledge is created and what types of knowledge are identified to form part of the territory. This serves to find out, whether the participant considers different ways of creating knowledge or if he/she differentiates knowledge forms in the first place. This category must not be confused with epistemology and logic, which is an aspect that transcends not only this bloc of questions, but all other analytical categories, expressing in classifications and patterns engaged by the participant to interpret the topics brought up during the overall conversation.

Future territorial imaginaries

This analytical category puts a focus on how the participant imagines the future of the territory by asking how, beyond what they had considered to be the future of their work, they dream the territorial future to be. In order to connect the present perception with this far-away future, the participant is furthermore asked what minimum conditions would have to be met to arrive at such a future.

The recordings of the interviews have been listened to in a first round and notes have been taken. Then, the interviews have been transcribed and read with the coding scheme below, which has been constructed before and cyclically revised throughout the process of data analysis (Saldana, 2009, p. 10ff.).

Analytical category	Code	Keywords
Territorial characteristics	Actors	
	Relations	
	Challenges	
	Opportunities	
	Future	
Concepts	Transformation	
	Innovation	
	Sustainability	
Local innovation	National Innovation Policy	
	Local Innovation Activity	
	Innovative Actors	
	Access to resources for innovation – projects	
Knowledge	Knowledge necessary to do work	
	Production of knowledge	
	Knowledge types in region	
	Potential of these knowledge types	
Imaginaries	Dreams about the territorial future	
	Involved actors	
	Minimum conditions	

Table 1: Coding scheme A

B) Reconstruction of narratives

The dataset has been read and coded in reoccurring cycles. The final coding scheme serves as a basis for grouping the findings into the narratives of transformation, which emerge as a result of grouping the findings of the analytical categories as presented above. Field notes are going to be referenced where valuable or where they complement findings. They will not be particularly mentioned when they replicate interview findings. In order to present the range of narratives, the content of articulated present and imagined future are going to be subsumed and presented according to the discursive elements (e.g. actors, mechanisms, events) they are formed of. In order to complete the spectrum of narratives, a next step of data analysis has to identify non-narratives. Here, Roe attributes the researcher with a sort of "artisanal role", where the identification of non-narratives depends a lot on her capacity of reflection and imagination (Cano Blandón 2010: 329). In order to complement this rather vague approach, this step will be conducted based on Boaventura de Sousa Santos' sociology of absence (de Sousa Santos, 2011, p.30ff.), according to which the discursively invisible can be traced by a close

focus on five logics of hegemonic reproduction. The dataset and the final coding scheme were questioned in five steps:

Logic	Question
Monoculture of knowledge	Do participants' answers depart from considering modern science as truth?
Monoculture of lineal time	Are certain societal groups considered more advanced than others due to their way of life?
	In which ways do participants refer to progress, development, modernization, growth, etc.?
Logic of social order	Are differences between social groups naturalized or hierarchised?
Logic of dominant scale	Do participants often put local measures into universal, globally dominant scale (GDP, global markets, etc.)
Logic of productivity	Are activities evaluated according to their economic productivity (potential for growth)

Table 2: Coding scheme B

De Sousa Santos identifies these logics within the hegemony of knowledge and refers to them as the "five principal modes of [re]produced non-existence" (2011, p. 32). This delivers guidance for rereading the dataset and imitating the narration of transformation based on discursive elements that can be identified in the territory with the help of field observations. It imitates the process of imagination considering these discursive elements based on conversation as well as literature and data review but that had not been mentioned by the participants.

C) Construction of a meta-narrative

A final step of data analysis aims at integrating narratives in order to reflect on common grounds (Roe, 1994), and by considering non-narratives, widening the scope of possibility. This step is guided by de Sousa Santos' sociology of emergence, which was according to him, inspired by Bloch's *Nicht* (Not) and *Noch Nicht* (not yet), whereas the former is the expression of the absence of something and the latter is the identification of "latent movements" of "how the future inscribes in the present possibilities and capabilities" (2011, p. 33). Whereas the sociology of absence aims at amplifying the visible and disponible "real" and "existent" (ibid., p. 34), the sociology of emergence departs from there and identifies possible futures that the present beholds building on the identification of possibilities and capacities (ibid.). This step will mainly express in the discussion of the narratives found.

3.4 Challenges

The research process has been facing some challenges that shall not be left untouched. First of all, the scope of this thesis and the timespan of the research limit the amount of data that can be included in the thesis. As indicated before, it is not possible to inquire all places of enunciation for technical reasons. Furthermore, this would not necessarily lead to more accurate research results. The abductive logic that informs this research understands the process of data collection and analysis as a cyclical process of collecting data, withdrawing insights, throwing them over, collecting new data and comparing corresponding new insights with the previous ones, and so on, which allows for a closure of the data collection process when it does not generate new findings. This principle has been guiding the process of data collection. However, some contacts were more difficult to establish then others. In some cases, for example, the process of attaining response took very long, agreed appointments were postponed or actors refused to share information with the academic public in general. In other cases, the issue of security made it either difficult or impossible to conduct interviews, both in terms of accessibility of the territorial and in terms of the security of the involved. Another challenge given by the research design is the validity of the results, as doubts might come up regarding the role of the researcher in terms of the interpretation of data. This challenge was taken into account both in the step of data collection as in the method of data analysis, as results are constantly put into questioning by a repeated inquiry of the research setting and the data.

3.4 Summary

The exploratory research derives its methods with orientation at answering how emergent sustainable futures can be derived from local narratives. Barrancabermeja is embedded in a PhD-research project on transformative innovation policies in resource-based, emergent economies. First of all, it serves as a case for this thesis project for the key role of petroleum exploration, production, refining and production for the sociotechnical regime of the territory for the past century. Secondly, local inhabitants suffer high degrees of inequality, intransparent governance as well as unlawful behaviour of public actors, social and environmental injustice while being legally committed to the principles of sustainable development. Lastly, local policymaking pursues the objectives of making Barrancabermeja "inclusive, humane and productive" (Plan de Desarrollo, 2016) and promotes the town as an "ecocity of water and energy" (cf. p. 34), while decisions are being taken in the exact opposite direction, triggering a struggle for truth and direction, momentarily illustrated by the controversy about fracking pilot projects.

Given the research objective of taking a close look at local subjective narratives in order to identify emergent sustainability transformations, the study opts for ethnographic fieldwork including 30 in-depth interviews with local actors, of which 27 are included in the data analysis process. The interviews are based on questions for the present condition of the territory, local innovation as well as knowledge and

future visions about the town. As a mode of analysing these discursive formations, the study utilizes a cyclical coding scheme that filters the transcribed information for exactly these categories. A second coding scheme is based on the sociology of emergence in order to identify emergencies in the realm of local subjective experiences.

The choice of methods responds to different requirements to the study that arise from the research design and questions. The abductive and ethnographic approach is given by its design as an exploratory and empirical case-study, which makes it impossible to ignore the interaction between researcher and field and addresses the challenges of classifying ethnographic observations and of filtering relevant information.

IV. ANALYSIS

This chapter is going to present how the territorial past and present was narrated in the conducted interviews. The pool of data was coded in order to filter information related to Coding Scheme A. These results were coded a second time in order to analyse for emergencies. The results are grouped in order to provide a structure for presenting the research results and local subjective narratives. In a second step, these findings are going to be discussed with regard to the theoretical approach and practical implications of the findings.

4.1 Results

This chapter is going to present the results of analysing the dataset with the two steps of coding presented above. In order to represent the flow of narration, rather than presenting a few quotes and passages, respective participant quotes are going to be integrated in the text. The quotes and aspects are then grouped according to the general topics mentioned by participants in response to the researcher's questions about the territorial context, local innovation, knowledge production and future dreams. They are furthermore presented taking orientation at de Sousa Santos' five logics of hegemonic knowledge reproduction. This ordering indeed is an act of analysing the data (by putting it into exactly this theoretical perspective). At the same time, this step shall serve to deliver an overview about the content of the interview before discussing it in more detail. Before the results are going to be discussed from a theoretical and from a practical angle, the narratives are going to be summarised to give an overview about "controversy".

4.2 Local narratives

First to mention is that without exception, the participants' accounts build on the impact that petroleum has had on the territory; "with petroleum, the territory was transformed" (PD). Every participant narrates the identity of the territory of Barrancabermeja as inevitably linked to the extraction of petroleum. In most cases, it is considered an economic activity that comes along with serious side effects, which channel into a need for change. This change, however, is perceived as an impossible endeavour, given the fragmentation of interests and degree of dependence, both of which is commonly referred to as highly complex. Connected to this is a deep sense of insecurity about the near and long-distant future.

Diversifying local productive activity

The significant weight of productive activity in the interviews, as well as in public debate and Barrancabermeja's everyday life, might come as no surprise. Almost every discursive element, to put it in theoretical terms, articulates in perspective of one central element: petroleum (PR; PW). As such, Barrancabermeja is commonly introduced as e.g. "a territory, that eminently lives of the petroleum

industry" (PI), as "a petroleum zone" (PJ), "naturally petrolero" (PX) and having "the largest petroleum industry of the country" (PK). The realm of productive activity is the one that is most explicitly narrated in terms of transformation. The origin for this call is shared. It is the economic dependence on elements in an outside landscape (PJ; PX; PZ) that leaves no room to the regime for manoeuvring crises (PA; PG; PX; PE), neither for taking measures in advance, nor for mediation in their aftermath. The discursive elements allocated on this landscape are global market prices (PJ), upcoming petroleum scarcity, "the state" (PJ; PV, PX) as well as multinational corporations (PA; PD). The consequences and directions of "the transformation that our economy requires" (PY), however, are narrated quite differently. Precisely, the productive sector is reproduced in two different strands. The first storyline is based on a narrated necessity to transform the petroleum sector as in making it fit to maintain. Considering the economic weight and social impact in terms of employment (PX) produced by the petroleum industry, "looking for alternatives has to go without neglecting that the petroleum sector will continue because, well, you can simply not neglect this. It is the sector that creates most employment." (PX). It is, according to this vision as simple as this: "The people of Barrancabermeja are fundamentally employed" (PV), so "in the city, everyone is more or less employed by the petroleum industry" (PI). For political decision makers above all, it is clear that "Santander and all of the Magdalena Medio region is rich because petroleum came up" but the perception that "within 30, 40 years there will be no more petroleum" leads to the conclusion that fossil resource extraction needs to be further expanded and, as this actor concludes, "therefore, gas is needed." (PN). While in this narrative, "we have this possible scenario which is that fracking will be utilized" (PX) or "necessary", others interpret this transformation as inevitable but one under which the territory is going to "suffer" (PD), putting the focus on increasing levels of dependence on foreign decisions; here, concerning foreign multinationals (PD), unknown environmental and social impacts, as well and a distraction from truthfully fostering alternative and emerging economies in the local realm.

Here again, petroleum functions as a central discursive element that sets the scope of possible futures, even for those that wish for other territorial futures. Within this scope, imaginaries and dreams that move beyond become irrational and impossible. "The future is not subject to dreams but to reality" (PI), I was told, when asking for any sort of personal dreams about the future of Barrancabermeja. "We are not going to go ahead and say: "The industry contaminates!", when it is this industry that we are living off" (PI). The industry is a symbol for local income and projecting this to other realms would be sheer nonsense. But the sense of stability that ranges from the presence of the machinery, the petroleum and the daily commute, is at the very same time the origin of insecurity. It appears unstable and weak, given that it depends on external decisions and global market dynamics and its proneness to crisis. And so is the city, local commerce, infrastructure and social investments (PK; PQ; PX) as everything runs back to the industry. This forms the basis for the second narrative line, which is expressed by every actor, regardless of the subject's expectations and dreams for the future. Everyone argues that the diversification of the economic sector is a definite and undebatable necessity (PA-PZ). This includes the

narrative of maintaining and expanding the extractive industry as described above, where the diversification alongside the petroleum sector is a precondition for promoting solid economic growth, attracting investments and an overall rise of living standards. It also includes economic diversification outside the petroleum sector as the precondition for moving away from the extractive sector on the long run.

The consideration that "petroleum is losing its significance", a trend that was starting now but would be evident "surely in the future" (PG), nourishes this narrative. Many subjects express a strong desire for building up alternative economic sectors so "that the territory of the Magdalena Medio can live and plan its life beyond the machines and having this refinery" (PD). Others would "like to see that petroleum would just stop" (PJ) categorizing "fracking" as "no proposal" (PZ). Here, the petroleum industry turns into the impossible, irrational condition, despite experiencing the opposite on a daily. A publicly debated direction for diversifying Barranca's economy is the logistics sector, in which Barrancabermeja functions as an axis of multimodal transport. (PI; PV; PQ). Another sector that is regarded as having big potential is the agricultural sector (PE; PQ; PS; PU). Large parts of the communities "want a region without petroleum, or better said, without the extraction of petroleum. Without having these horseheads around there all day. We want to have an agro ecological region, alimentary sovereign, a region free of contamination of mercury, a region with good roads, with a working commercialization system for agrarian goods, technical assistance, all of these productive dynamics. The same imaginary accounts for health and education." (PC). While the cultivation of caoutchouc and palm oil (PF; PU) but also of food products like avocado, cacao, plantains, yuca and all sorts of vegetables and fruits (PC; PE) are a common future imaginary, the orientation towards strengthening the agricultural sector has been largely ignoring its "forestry vocation" and the production of pine trees (PU). An orientation at scientific data would help guide respective planning, rather than clientelist and short-term profit-driven planning that resulted in 50% of the lands utilized for large-scale agroindustry and meat production, which would result in a wide-ranging misuse of ecological preconditions (PU). Besides this, tourism has been often narrated as an economic option for the future. This view is based on the extent of water areas all throughout the territory; the swamp lands, the smaller rivers and of course, the Magdalena area with all its islands, flora and fauna. But also, the history, myths and traditional practices connected to these spaces, offered room to explore (PB). Simultaneously, the variety of social groups and tradition (more detailed in 4.3) are narrated as a great asset and point of departure for constructing "productive networks" (PZ), which independently construct both local productive as well as immaterial value. (PM; PZ).

The third narrative strand deals with the direction and governance of productive activity in the territory. Expectations about emergent economic sectors are being mediated by doubts about the generation of locally wide-reaching economic dynamics, or in other words, whether these models can be set up in a way that creates benefits and "articulates all of these actors" (PA; PJ). This is because income, as well as hopes, expectations and projects have not only been depending on a single sector, but

on a sole actor (PP). Within the provision of services and public goods, such as public transport, energy and water provision, waste and wastewater management, monopolization has led to poor qualities of public services and high consumer prices (PD; PP; PY; PX). Tendencies to build up emergent sectors 40 large-scale oriented and "top-down" reflects in the already emergent area of logistics. While there have been a few smaller port and logistic operations, the Swiss multinational "Impala Terminals" recently invested in the construction of a huge multimodal port, a "mega-project". However, "the relation between the city and the port, I do not see it and I do not find it. The expectation that arose was extremely high. And after it had been constructed, both became apart" (PV) or as another participant says "there is a logistic centre that does not only exploit in economic but also in social terms. Because I have seen no employment coming from there" (PB). Putting the building of emergent economic sectors into foreign hands without setting up control mechanisms (PV) is an observation that frustrates a lot of engaged citizens. A research team that had engaged in the search for feasible local economic alternatives a couple of years back had suggested the construction of multimodal port site and planned out corresponding transport infrastructure such as roadways in detail. However, authorities did not share their enthusiasm and furthermore, the team was confronted with all sorts of administrative hindrances, such as environmental licenses. "But then there is a multinational and it simply locates itself in a prohibited place because it's the river basin zone. And we give them the permit." (PV). But coming up with a similar project as a citizen, according to this participant "they just tell you no, this will not work out" (PV). For smaller operators, competing with multinationals then becomes an impossible challenge, as an affected actor states "while we are only a part in the chain, they are the chain. And my relation to them is zero. They do not need me." (PI).

Apart from the monopolisation in the logistics sector, the agricultural sector is regarded similarly ambiguous. Besides the already mentioned inadequate use of soil and clientelist investments that hinder the building of long-term economically sustainable operations (PV) for medium and small-scale farmers, efforts of promoting agricultural activities mainly focus on industrial operation and commercialisation of goods towards the "exterior" and global markets. At the same time, only 7% of all agricultural goods consumed in the city are produced within the territory (PV). It is very unlikely, according to professionals in the field that "necessary investments" (PC; PF; PU) are made in the building of an agricultural structure that competes with the salaries of industrial operations on the long-run (PV), and that builds a well-functioning territorial and interregional commercial pattern. Multinational and large-scale industrial monopolies also generate difficulties in terms of local economic governance, as e.g. regulating cash flows, as there is almost no control over the use and direction of foreign investments (PD), taxes and royalties nor "any insight into financial performance" (PV). Often, foreign operators return a minimum amount of revenues in the form of taxes so that "we literally end up paying the companies", not only in terms of money but with local resources, such as water (PD), which are needed for respective activities.

This entirely unregulated and unmonitored utilization of local resources for economic activities ironically threatens other established economic sectors, some of which have a tradition of several thousands of years in the region. “Long before, you went out and catched like 200, 300 or 400 fish, nowadays you leave and with 10, 15, sometimes nothing you return.” (PJ). Due to the industrial contamination, the sedimentation by the waste waters and the change of river courses for megaprojects [e.g. a hydroelectric plant], all these swamp lands are “completely lost” (PJ). Here as well, the industrialization of fish production is projected as an alternative, which however does not solve the loss of biosystems, native species and the fishermen culture (PJ). These economic sectors are not enhanced but forced to “disappear” (PJ). “The artisanal fisheries or the fishermen […] is an activity that actually had to disappear” (PU); as for the public sector, this is more of a subsistence project that is of no value for the city (PU).

The fourth strand of narratives about the productive sector expresses deep pessimism about economic alternatives due to their conclusiveness as a future projection. Regarding the experience with setting up local projects, some consider popular economic alternatives as “giving us just another lie. Tourism is not the solution for Barrancabermeja. So, are there going to be like 40.000 foreigners around here to see what? The river? The contamination of the swamp?” (PD). Related efforts are perceived as a drop on a hot stone, as e.g. articulates “in terms of this port; […] is this going to be like Hamburg, are we going to view the container ships passing by like in Buenaventura? No, brother, I don’t know; the alternative, I do not see it. I do not see this in 2040, nor in 2050 being a… no. There is no future.” (PD). In other areas, too, pessimism shines through. “Yes, we could do something for tourism but from there on, there is nothing else. If you ask me, it is really difficult” (PI).

What “worries” in the realm of agriculture, is that the way in which economic activity is set up “might generate more social and environmental conflict. With regard to future generations we really want to project productive activities that work out on the long-run” (PC). Apart from that, industrial cattle farming and palm oil and eco fuel operations run the risk of monopolizations, as “half of the shares belong to [company] and the other half of large palm oil producers” (PF). At the same time as tying the economic future to multinational and large industrial operations that focus on the exportation of the produced good, there is little planning centred on constructing “added value” (MI), of productive chains that remain within the territory. “They ship Colombia’s capital to other places.” (PD).

Further doubts are expressed in the growth of the drug trafficking sector, “which is increasingly bringing the consumption to the communities” both in the rural and urban areas (PC; PG). The general “lack of clarity in the projection of our city” (PZ) is brought in connection with a system in which “small and emerging economies […] have no space. […] That way, the others, the alternative, for example fisheries, agriculture and community and social work have got no room […], it is pushed to another level. To another form. Because it does not inform, not nourish this industry.” (PR).

In order to sum up, the transformation of the productive sector is subject to four main narrative strands. First of all, the petroleum sector needs technological innovation, mainly interpreted as fracking,

in order to maintain its position in the future and become more sustainable, as well through technology. A second narrative is economic diversification through the promotion of alternative economic sectors, such as logistics, agriculture and tourism. The next narrative addresses the monopolization of productive activity by a few economic players, mostly multinationals. The fourth narrative articulates a pessimistic 42 picture about these economic alternatives, in which past experiences play a role as well as the lack of conclusiveness of these projections.

Social diversity vs the legacy of conflict

The story of a high degree of social and cultural diversity and civil society action contrasts with a narrative that is based on the territorial community as highly divided and conflictive. We are going to start outlining the first of them. It narrates a territory marked by diversity; rich in culture and history and filled with different identities. Social groups that were articulated as such within the interviews were small, medium and large-scale farmers (PU; PC; PD), the working class (which is today characterized by contracted and short-term workers (PW), a growing student population (PV), women (PO; PT; PZ), people with disabilities and special needs (PM; PT) fishermen and those that live along the river bank and an urban population that is characterised as warm-hearted, welcoming and hardworking. Additionally, Barrancabermeja includes a range of non-humans, especially in terms of different bird populations, the jaguar, the manatee, reptiles, amphibians and fish species, water ecosystems and mountainsides rich in water and forest (PK; PP; PY). Many of these identities, groups and interests are institutionalized within organizations, federations and associations, which emerged in order to fill the gap of political representation, in order to articulate themselves publicly and in order to promote and defend their political rights (PO), historically formed in order to "confront armed actors, but without arms." (PR). While the city of Barrancabermeja is marked by the influx of people from all over the country (PD; PM; PV), all these different traditions are increasingly growing together (PV), which holds a lot of potential to create a common culture (PM) based on different styles of music, arts and food. The social organization is highlighted as a specific characteristic of the territory. It is expressed as a mode to articulate the rights and needs of every group by its members themselves, e.g. because "even though men are conscious about our needs and our value, he will not defend them just like a woman defends her rights. […] It is necessary to articulate ourselves within public and private areas" (PO). The organisation of interests and identities in various groups is an instrument to create a space for identities within the social totality, within the public and in productive sectors. The later becomes especially important to expand the future outlooks for the upcoming generation, that currently run the risk of being involved in illicit economic activities, a growing sector both in the urban and in the rural field (PG). "The potential for synergies [amongst social organisations] is very big" (PS). The integration and collective articulation of their imaginaries, however, remains a dream (PC). 43 This leads to the second direction of narration frames social diversity as a potential asset but contrasts it with a reality in which "the armed conflict stopped but the social conflict continues" (PC). Social identities and interests are

overshadowed by political positions, the stigma that is connected historically creates an abyss that is difficult to overcome and extends to various types of activities. The success of local projects, for example, depends on the (alleged) political orientation of those involved, so "if you are of another political party, you cannot be trusted nor supported but if the next mayor is of your party, well, no problem" (PU). Political positions therefore interfere in the persecution of common objectives as programs and developments are suddenly being stopped with legislative turns (e.g. PD; PJ; PM; PU; PV; PX). These political aversions overshadow all ambitions to pursue long-term projects and plans, which seldomly survive an electoral turn. The complexity and brutality of the decade-long armed conflict left a deep feeling of mistrust, articulating in "this military logic that we have, this logic of war" (PZ). The transformation of this logic towards a "post-war" period had been initiated with the implementation of the peace treaties. While this is valued as a great achievement, the reality of its implementation is observed critically. A new government and a president, that questions the terms and conditions of the peace treaties and instrumentalizes and further strengthens a right-left division discourse stigmatizes social organization, especially in poor and rural communities "and political stigma, in Colombia, is highly dangerous" (PC). "With the entrance of paramilitary actors, all of a sudden, we were all labelled guerrilleros […] and somehow, pursuing a libertarian, collective logic turned into a delict." (PZ). Secondly, it is a hindrance for building strong political oppositions "because to them [the political class], it is of no interest that the people organize. Because people that are well organized and that are well educated… you already know" (PR). And this division is carried into the society and translates into mutual mistrust. It was not rare to hear about "them" or "the people" being ignorant, inactive, even stupid and, hence, incapable (PD; PX; F12). Not only is it the mistrust amongst social groups, interests and identities that triggers the orientation "outwards" in the decision-making, planning and execution of local projects. It is also the reproduction of a colonial logic, that has been dominating the social order with the arrival of the Europeans, to the initiation of its extractive industry, the systemic extinction of the Yareguíes, throughout the initiation of the extractive industry by US-Americans and up to this date (PW). "This is the problem. We do not believe in ourselves. And then some Swiss come around, construct an entire port site […] which will be working like that for at least 50 years. And we have lost that. And we were not capable." (PV). After all, many recognize the distracting potential of internal conflicts as a great hindrance to focus energy into mutually beneficial projects. In terms of the port site case, the participant concludes "So, from Switzerland, they are able to see this potential, a potential which moves them to make all the necessary investments and say 'over there, in Barranca, yes!' So, they see these opportunities from all the way there […] and we are not getting a * out of this? Could it be that they colonized us a second time? And this is the analysis that has not been made by the committee, nor by the political class nor the administrative class, nor anyone. That's it. It is like all the rest of the world saw the opportunities that might exist in 44 Barrancabermeja, while we are concentrated on other issues, for example, on fighting amongst each other, discussing amongst each other, looking for ways to make life harder for our neighbours. But we never put ourselves

to thinking about our potentials." (PV). Other experiences are similarly discouraging: "back in university, I saw some people having good ideas, which they developed further but at some point, they needed financial and technical support. So, they went to Colciencias, no. They asked at Ecopetrol to develop their idea. But no, Ecopetrol went for the North American product, which was exactly the same. So, I wondered, what if the state had supported all these efforts?" (PI). Hence, the strategies are seldomly pursued in collaboration, in concertation "with them? No." (PQ), "we continue to proceed everyone for themselves, for their interest and nobody bothers about uniting forces in order to promote developments" (PA).

"But the state…" – The issue of governance

The third narrative in this realm is the one about "the state", an external force in the form of a "government that does nothing" (PJ) or that "says one thing and does another" (PI). This motif is engaged usually in order to narrate modes of governance, which is mostly allocated on this external, landscape sphere of agency, as "them", a political class that manages clientelist relations and related projects and instrumentalises discourse to stay in power (PR). With the economic monopoly of certain entities, as pointed out above, comes a large degree of political power. Large private actors execute public tasks like organizing communities' education, financing social programs and schools. (PE) What adds to that as a consequence is their power over the design of local infrastructure, such as an oil company operating hospitals, schools (PV) and higher education programs (PQ) including its capacity to define vast parts of the urban space, such as the industrial river bank or the city symbol "Christ the Oil Worker", but also by its possession of rural areas, in which it can followingly close areas to the public, cut down forests and put up machinery. What results is an ambivalent relation between Ecopetrol and the local population (PE). From the latter's perspective, "the company", as it is popularly called, comes along as a black box, whose decisions are everything but transparent and conclusive. This frustration articulates as a "love-hate-relation" between the population and Ecopetrol (PE). While it is a source of income and potential territorial well-being as "here, those who live best are the employees of Ecopetrol" (PI), it is also critiqued for not acting proactively and in favour of the civil society (PJ).

Further problematized is the autonomy of powerful entities in front of the constitution, as "a constitutional and legal duty for Ecopetrol is no obligation." (PV) This becomes apparent e.g. in the management of environmental crises their operations produce. The entities in charge to push multinationals to fulfil their constitutional and societal responsibilities sometimes lack the resources to execute their legal duties, as in the case of alleviating the ecological consequences of the oil spill at La Lizama. "This is an operational issue, we do not have the tools to act, Ecopetrol possesses them, just like those for investigation." (PK). At the same time, these operators usually possess an environmental license which gives them "authority over all activities while creating damage on a daily basis" (PK). The written rule articulates as a legitimization for activities of vested stakeholders but lacks its full implementation. Therefore, "the state" as such does not provide policies where regulation is necessary

(PN) and does not follow regulations already set up. Legal mechanisms that have been introduced to control and manage natural resources, for example, become a legitimizing tool. The lack of accountability triggers a vicious circle, as "resources do not arrive" (PB) at their destination and with the lack of these resources, programs cannot be fulfilled as planned; public entities cannot execute their responsibilities as provided for by the constitution (PV). "So, while they are talking about the environment, they are giving concessions to a multinational to extract resources and contaminate and damage hydro sources" (PJ).

The issue of corruption and misappropriation of resources in the execution of local projects is problematized by most of the participants, but specifically highlighted is the connected issue that there is no "serious proposal" (PZ) and that "corruption is a very severe topic in this region" but the ignorance of political agendas; "that for me is corruption" (PT), the fact that the administrators of this territory are not planning towards sustainability transformations "which are mentioned in all development plans […] but finally it does not reach reality. And look at us in terms of poverty. Look at us in terms of health, in terms of development or education. One encounters big vacuums. The topic of royalties; for us is a big pain […] and were inadequately placed." (PT). This lack of implementation and transparency does thereby make the orientation towards external actors, as mentioned above, a necessity, as many organizations rely on international cooperation in order to receive technical and financial support (PC; PJ). While the financial resources are centralized, as in "the municipalities would be dead without us [government], they have limited capabilities" (PN), offices and agencies depend on higher authorities. The process with which revenues are centralized and then redistributed, is perceived as extremely complicated (PQ). Somehow, this narration makes "the state" even come along as an opponent that instrumentalises stigmatizing and separating discourses, misappropriates financial resources and fails to formulate clear strategies (PM; PZ) that solve the issues of the local population.

On top of that, the relation between "the state" and "us" remains invisible for most communities, who "have never seen a member of the town hall in here" (PC).

To summarize the components of the three narratives presented in this section, the territory has been marked by a great diversity up to the present, both in terms of humans as well as non-humans. The territory is rich in culture, flora, fauna and the interests, thought and activities that are connected to that. At the very same time, this diversity is marked by fragmentation up to conflict. The orientation towards non-local actors in the governance of the territory accounts as an origin and consequence at the same time. Lastly, in terms of governance, the role of "the state" is narrated as the governing entity, which takes short-term oriented, clientelist and intransparent decisions. This contributed to the general atmosphere of uncertainty and opacity. What adds to the narrative is that the monopolization of economic actors oftentimes translates into both legislative and executive power over the local realm. 12 Development plans represent the agenda and respective budgeting for the legislative period 13 Royalty system, which also finances Science, Technology and Innovation 46 Corruption in the governance plays a big role and is often referred to as a vicious circle that covers both he misappropriation of financial

resources as well as the contribution to the non-implementation or nonrespect of political agendas and legal frameworks.

Knowledge production as a cultural vs. economic activity

The realm of territorial knowledge production is predominantly put into perspective of how and what knowledge is produced; secondly, the circumstances and conditions of its production and lastly, the utilization of this knowledge. As these areas all interfere, it is not possible to regard them separately.

The biggest producers of territorial data are economic actors, which is regarded critically because this data serves specific purposes, such as acquiring licences for their projects (PD; PX). Despite operating large research and investigation centres (CF; CI), Often, however, this data is of popular interest but not publicly accessible. Decisions are based on respective data without the consultation of the public (SF). This causes a "lack of knowledge of the people" (PE; PM; PT). It can be illustrated by a case in a neighbouring territory, in which one day large machinery arrived and initiated gold extraction. For both municipal authorities and the population this came as a surprise; neither of them knew about the rise of the global market price of gold nor about the knowledge of the involved company about local reserves, nor about their permit to operate (SF). Another example is an oil spill that took place in a community of Barrancabermeja "La Lizama", which contaminated aquatic bodies all around, but whose precise extent and consequence has never been publicly clarified. While the responsible company started to take action seeking support by US-American specialists after several national authorities created pressure, the case was soon put down, stating that the oil spill had been "cleaned up" (F5). Calls by affected communities who urged for further clarifications about the environmental and health impacts were deemed as creating panic and taking the incident as an opportunity to receive financial compensation or being evacuated in hotels for a couple of nights. "For these people, that is something special" (F5).

Most participants regard the university and the scientific institute as an independent and reliable and open source of data, with which indicators, long-term monitoring and research could be facilitated. There is a predominant conviction to integrate academic and theoretical with empirical and practical knowledge. While certain subjects express that empiric knowledge: "is not relevant anymore." (PN) and that "small farmers do not innovate" (PI), the academics are "slowly changing" (PC; PR) towards recognizing the potential of establishing and institutionalizing dialectics between academic and "popular knowledge" (PE; PM; PQ; PR). Frequent studies in collaboration with countrywide institutions would help to conduct comparisons and resulting data could have a great impact on alleviated uncertainties and insecurities about various topics (PF; PX). At the same time, this would untangle the production of knowledge from economic and political purpose. In subjective experiences, knowledge and data were engaged in service of "what sells and what you can buy" (PZ) and corporate interests determined what scientific research works on. When a team of foreign and national economic and political representatives inquired selected social leaders on their opinion about fracking a few years earlier, this did not come

about as a dialogue and exchange of considerations but an investigation into what type of arguments (and persons) had to be addressed and what types of corresponding facts would have to be engaged in order introduce this technology in the future (SF).

In this sense, many desire independent academics that are alleviated of the stress to serve the established economy but to push thinking beyond borders (PZ; PR). This articulates in the formation of collectives focused on the humanities, but also in terms of promoting the recreation of an immaterial culture in combination with the production of knowledge (PB; PN). This also accounts for the promotion of art as a "universal language" that transfers knowledge and triggers thinking (PR), as "art is essential to any society. It must not disappear." (PR). A more interdisciplinary training in social sciences would help to produce observers like economic analysts within the territory, which especially research institutes are missing: "I do not find them here" (PX). The amplification of scientific knowledge production in a dialectic process between academic and empirical traditions would not only enrich the body of local knowledge but help to build up productive sectors (PQ), next to representing a productive sector itself (PV; PS). The social and cultural richness of the territory had to be understood as an asset in the knowledge sector (PY), as different social groups offer different perspectives on the same issues, which can sensibilise the population and expand the understanding of causalities (PM; PT): "I do the same things, but in a different way". The same accounts for tackling collective challenges, e.g. in the field of sustainable production: "these people want to produce sustainably, because they always have" (PC), and their insights can add to modern scientific research in the field.

Little effort is put into promoting territorial research and fostering respective knowledge and technologies, "it is only about copying the example of a neighbour" (PU) and "we are waiting for other people to tell us what to do. Here we need to start a process of re-education" (PB). But autonomy in the production and use of knowledge creates "the ability to administer power" and therefor faces the political hurdle, sometimes even danger, to those who promote respective developments. "The political class […], to them it is of no interest that the people organize. Because the people that are organized and that educate themselves, well, you know." (PR). This is perceived the reason for that knowledge does not "arrive at the communities" (FC).

Some subjects highlight the way in which knowledge also marks identity. And the political impossibility of certain knowledge, hence, endangers connected existences, which is extremely hard to grasp for the affected, "because you have your mentality" (PJ) and having no grounds for existence "you start to go insane." (PJ). This generates the feeling that "the creation of knowledge a lot of times is turned against the people, against live." (PZ). In order to promote critical thinking (PV) and self-critical reflection (PY), historical and philosophical knowledge can deliver points of reference. Territorial research shall therefore also work out historical identities of the territory (PX) but at the same time open up to the world (PV) for an interchange of knowledge. Combining this with knowledge about global connections is regarded as crucial to maintain territorial identity within a globalized age. Multinationals can exploit this, because they are "situated in various places of the world from where they withdraw

empirical knowledge about how to act in weak states" and then apply those schemes to Colombia (PK). For economic activities alike it is regarded as crucial to possess some deep knowledge about the territory, not least because "the barranqueño, because he does not know what he has got, he does not value it." (PB), but also to know about the global dimensions this area forms part of (PF; PI; PM; PV).

In order to summarize, knowledge production is narrated as a process that is instrumentalized against the citizen as such and rather supports larger economic interests. Potential is seen in the combination of territorial, empirical knowledge and modern scientific knowledge in academic activities as well as thirdly, its orientation at the territorial condition. An aspect that shall be mentioned is the omnipresent call for better investment into research and teaching activities, as funds should go directly to respective institutions and "not through the hands of politicians", because they serve political and economic interests over those of local knowledge producers (PI; PQ). Locally situated private actors should also be involved in financing education, however in a direct and unconditional manner (PQ), which means that e.g. petroleum companies fund the university as such, not only with the condition of promoting chemical and petroleum engineering programs.

What is sustainability?

A specific focus is placed on the scaling of sustainability, as an analytical category the interview focussed on. First of all, sustainability is interpreted as to actively maintain a certain condition, as "from an economic point of view" (PV), referring to the objective that these operations "maintain within time". This ties in with a predominantly economic scaling of human activity, where activities are valued exclusively in terms of their added economic value (PI; PX). An example is the value of fishing and farming not as a traditional activity as part of territorial culture and history but as an economic sector. Hence, a prominent opinion states "the people cultivate, the people fish, because if you have no other option for work […]" (PE). Further concepts that are interpreted as economic activities are innovation as an activity that is driven by companies only, described as the process of bettering the quality or form of a product in a way that generates a surplus of added value (PI; PN; PJ). Other interpretations move beyond the economic realm and define sustainability as "maintaining what is above the human" (PZ) and bind "economic growth" to not "damaging our shelter, the master's house" (PY). Human activity has to "focus development on the people first and then on highways and buildings" (PE). Sustainability then also means to provide and maintain livelihood adequately to the living conditions, "including mental health" (PJ).

In that sense, for many sustainability begins with a "change of logic" (PZ) that informs dominant scaling. This change of logic is desired in a multitude of ways, ranging from the consideration of all social groups in the projection of the city and 49 recognizing the limitations of the predominant system, rather than covering it up within the political discourse (PO). On the other hand, this connects to a responsibility that departs from everyone (PD) and started with a transformation of "how I relate to other things" (PE). The relation between the subject and those "things" can add up in sum and inform

something that results as a sustainable future (PM). These relations are expressed in terms of e.g. a turn away from a patriarchal logic so that the "concept of development would be much more respectful; towards the environment, life, creating conditions for contentment first." (PZ), but also in relation to non-human life for "transform[ing] the way in which people see environmental problematics. We hold very little interest – the oil spill would have been a scandal throughout the world, here, nothing happens. In the territory, there is the root of an ancestral tribe, which protected the environment they lived in. Today, little is taught about this to the children." (PY) This quote does not only address the issues of mistaking natural resources as private property (PJ; PY), but simultaneously illustrated that the transformation of looking at the world is not only an issue of education but appears on the scale of day-to-day life.

In connection with sustainability, this is interpreted to start with a change of habits, for example in terms of recycling used goods (PC). The protection of "our homes and the habitat for our communities" (PD) as a call for prioritizing human life and nature is deeply connected to the project and dream of "improving the economy" (PI; PK) and makes the "different vision in terms of resources" (PA) a necessity. Such developments should be sustainable themselves, in the sense of maintaining over time (PV), which leads us to the next narrative category. All in all, sustainability is defined as productive activities who maintain on a long run, which in turn are classified according to the added surplus value generated. Furthermore, sustainability has been connected with social and environmental well-being and with sustaining "life" as such, regardless of the economic value of an actor, resource or similar. This later has been connected to rethinking habit and thought.

Transformation as a matter of time

When addressing the issue of time, local history is ultimately narrated according to the history of the company and partly also to violent conflict "because this industry that you know well and that we all know very well is connected to many years of history" (PE). Many years of history, however, commonly start with the extraction of petroleum and the initiation of the extractive industry, while obviously, the territory had existed before. The present identity of the territory, however, is rarely connected to the times before the previous petroleum transformation, even though "the social basis ranges back to colonization, farmers, everything, indigenous communities, actors that have been defining the territory historically" (PC). Especially social scientists are making the call for investing mental and financial resources into historic, even archaeological investigation. Interestingly, moving way back into the past in order for "old logics" to "be carried into the future" (PX) is considered by many a key to constructing alternative futures. "The future is to reconstruct all this culture, all this historic process along the Magdalena River" (PE). Actively working with the past also helps transform the state of Colombia as a "mentally traumatized country" (PF). Memorization and investigation of the dynamics of the civil war are regarded as a "necessity to leave certain chapters behind" (PX). The treatment of the war in historical terms would help to picture a more united society and help to alleviate

of continuous social conflicts that connect to this "logic of war" (PZ). The generation of knowledge and treatment of trauma is regarded as a necessity in order to not repeat it and to re-establish common territorial identities. (PK; PR).

In terms of the ending of social conflict and civil war, many articulate "time" as the most important factor. "Sustainability is a question of time. Such as every transformation. The term transformation has something fundamental and that is simply time. You cannot talk about transformation, for example, of a society, of a country, of a culture within short time" (PV) Accordingly, collective planning and policy making has to consider this aspect, because "If there is something the country is good at, it is short-term thinking" (PU). Rather, "cities have to be planned ahead for long-term, with a vision." (PB). It is exactly the knowledge about past events, which help to generate the much needed "consciousness about where we are" (PC), instead of a comparison to societies that seem to operate further ahead in the linear course of time (PF). "The projection of the future and investments cannot only be made in terms of economic return" (PM; PH). Because while many say that "poverty makes people live back in time" (PX), it is often this exact logic that forces them to stand still or to "disappear" (PR). On the contrary, innovation seems to be the secret to all problems, as it not only helps resolute smaller and bigger issues of the present, but as it is "bringing us into other times, without innovation we are stuck" (PJ). In order to summarize, most narrate time as a linear course, along which space is defined. In terms of conflict and poverty, many refer to society as being back in time, and to innovation as bringing society into novel epochs. Simultaneously, time is considered to be a fundamental factor in the planning and working of transformative change, so that policies and projects have to be undertaken with a longterm vision about their consequences.

4.2.1 Summing up the controversy – the meta-narrative

The participants were asked about the territorial context, local innovation, the issue of knowledge and their dreams about Barrancabermeja's future. After diving into these dimensions, the second round of data analysis has been conducted from five angles; productive activity, social order, knowledge production, dominant scaling of sustainability and the notion of time and space. In order to sum up the controversy about the Barrancabermeja's present and future, this chapter will revisit the central storylines in a short version.

In terms of the first category, productive activity is framed as in need of transformation. This is narrated in two different ways. The first portrays this transformation in terms of increasing the productivity of fossil resource production through fracking. Both fracking and conventional petroleum extraction shall be transformed into more efficient and environmentally friendly activities through innovation. The second highlights the necessity to diversify the local economy by promoting alternative productive sectors, most prominently the logistics sector, agriculture as well as tourism and culture as in restaurants or cultural festivals and the realm renewable energy in order to overcome the fossil dependence of the local economy on the long run. Thirdly, the monopolization of local productive

activity is pointed out at the example of planning economic projects in a large-scale industrial design (mostly export oriented) and the dependence and powerlessness of smaller actors. Lastly, economic alternatives are viewed pessimistically, which translates into a pessimistic narrative about the local future.

Social order is narrated in terms of a territory that is marked by a high degree of social diversity and the organization of corresponding interests. Secondly, this diversity translates into fragmented interests and segregated life worlds, which is seen as a hurdle when it comes to local projects.

The issue of governance is frequently addressed. Narrated in terms of "the state", it is marked by the absence of a long-term vision combined with an intransparent allocation of resources from royalty funds. But also, powerful economic actors are addressed, who show a lack of compliance with the legal framework and operate in a way that is of little benefit to communities.

Knowledge production has been framed as being oftentimes subject to economic objectives, so that academic education cannot develop equally into all sorts of directions. Furthermore, economic actors that operate in the territory are the producers and owners of a large part of territorial data. The predominant narrative is to further pursue the production of territorial knowledge and data combining empirical and scientific knowledge traditions. The promotion of a strong academic sector is welcomed both as an economic as well as a cultural projection on the long run.

Sustainability is scaled differently, for example as fostering economic activities that maintain over time. On the other hand, sustainability was interpreted in terms of preserving the space we inhabit (the "master's house") and creating social well-being for the generations to come. This was connected to a shift in thinking and in learning towards critical thinking and collective action.

Lastly, the interest was how time and space are connected and narrated from a subjective stance. Usually, the local space identified as Barrancabermeja "started" in time with the extraction of petroleum and only seldomly was it interpreted in terms of its older history. In case of the later the future was tied to a process of learning and investigating about the myths and histories of the Magdalena River, thus expanding the cultural basis of the local identity. In another dimension, time and generational change was framed as a precondition for societal transformation.

4.3 Discussion – Implications of the results of data analysis

The pool of data has been firstly filtered in terms of the actual answers given to questions about the territorial condition, local innovation, knowledge production and future dreams and visions. Then, they were revisited with a coding scheme based on five logics of hegemonic knowledge (re)production in order to identify and amplify the objective basis for emergencies towards a post-carbon future for Barrancabermeja.

4.3.1 Theoretical implications of the results of data analysis

To start with a theoretical discussion, we will address the key findings about hegemonic articulation of Barrancabermeja's sociotechnical system. As Hermwille (2016) points out, the translation of discursive events as landscape shocks into novel hegemonic narratives that inform investment into and empowerment of innovation are considered as a moment of conjuncture for sociotechnical regimes. The perspective given by the multilevel perspective, combined with the angle delivered by the discourse theoretical perspective outlined in chapter II leads to the identification of crude oil as the element which defines the landscape of Barrancabermeja's sociotechnical realm. Instead of forming part of the sociotechnical regime, it *articulates as the landscape*. Firstly, it determines the meaning and function of every other element in the totality of Barranca's discursive formation, ranging from material infrastructure over the quality of the natural habitat to capabilities in knowledge and innovation. Subjective narratives express this; participants often put territorial characteristics into the perspective of the existence of crude oil and the petroleum industry, for instance, or are not able to formulate visions beyond related territorial identities. Local dynamics are directly depending on petroleum-related dynamics in a chain reaction that impacts seemingly unrelated efforts, e.g. promoting culinary or hospitality economies. A second argument for crude oil defining Barranca's landscape, is the local petroleum network (from crude oil to decisions and machinery) articulated as an external element that is extremely stable and somewhat out of reach for regime elements, including its rules and procedures, such as the organization of income (royalty fund) and its management by an extremely powerful actor. Thirdly, the discursive struggle about the meaning of petroleum for the future of Barrancabermeja underlines the role of disruptions in terms of landscape elements. In Barrancabermeja, the phenomenon of economic dependence and increasingly perceivable negative externalities of the petroleum industry represent examples for these disruptions. But also, the economic crisis narrative contributes to hegemonic shifts in the perception of the petroleum industry as providing stable income and livelihood for the region. Another major influential factor in the regard is an emergent social and environmental justice discourse, which deems the fossil resource industry and its innovation into the direction of natural gas extraction with the technology of fracking as a "project of death". What adds to that is that the outlook of already emerging economic sectors is slowed down by the impact of petroleum extraction, e.g. the expansion of academic and empirical knowledge production due to mental determination[8], agricultural activities due to contamination of soil or water or tourism by the destruction of biodiversity.

The analysis and ethnographic process supports the theoretical assumption about the role of power as knowledge in the formation of these narratives. Rather than reproducing "collective" narratives, subjects pick up on certain discursive elements and reproduce meaningful accounts on the

[8] This refers to educational programs in engineering, the outlook for young professionals when choosing their educational path, but also refers to the process of information of the rural by corporate and activist actors addressing myths. It also refers to the hinderance of the natural flow of empirical knowledge generation when being forced to invest respective resources e.g. into finding out why fish populations die instead of under which conditions they flourish or finding out why community members show skin irritations and respirational problems instead of engaging in the improvement of health.

basis of what is considered probable and possible, tying events into a subjective frame of the known and imagined. This expresses in different ways, as the narratives about productive activity show. The maintenance of livelihood in the territory cannot be imagined beyond petroleum infrastructure, as for example without horseheads, pipes, an oil worker's culture and without the machinery. In this way, the future of productive activity beyond negative effects can only be thought by improving this industry, by expanding its technological capabilities and hoping that this territory one day will see the great benefits of extracting fossil resources. And the fact that the territory cannot be imagined beyond petroleum also reflects in those narratives that wish for economic alternatives; they remain mediated by the territorial "petroleum vocation", translating into a sense of pessimism about the local future in general. And this power-knowledge nexus conditions fantasy, too, both in phantasmic narratives about desired futures of a peaceful and healthy territory, based on e.g. solar power, cultural and creative economies, agriculture (forestry, fisheries, cultivation of fruit, biofuel crops in the fashion of small-, medium- and large-scale farming), digital platforms or tourism, to mention prominent examples, but these visions seldomly hold a concrete agenda for the present and remain future visions. On the other hand, the horrific or beatific side of fantasy expresses through a perceived threat by the absence of the petroleum regime, equalled to the absence of an economic basis. The later contains the contradiction that the threat of an absent economic activity is already taking place *with* the petroleum industry in power, as expresses through the narrative of economic crisis. Both imaginaries cause a sense of insecurity about the future and inform the pursuit of future objectives within the realm of fossil resource extraction. Such narratives rather empower innovation that expand the petroleum sector, as is the case with the implementation of fracking. Here, innovation that stretches and transforms the use of petroleum and the execution of alternatives in the field of e.g. logistics, forestry and agriculture show, who are not promoted with the similar effort.

Despite the diversity in social identities and connected activities, this asset is not reflected in the corresponding lifeworld, especially in the institutionalisation. This becomes evident when listening to the experience of subjects whose identity departs from the dominant extractivist logic (the small peasant, fishermen, people with disability or individuals of non-patriarchal logic), ranging from the struggle to express to the struggle to exist. This contradiction becomes most evident when in narratives about the diversification of productive activity as highly important and then simultaneously express that certain activities are not compatible with industrial objectives and therefore need to disappear. How can the goal of diversification be reached with an agenda of eliminating diversity? The social fragmentation and partly poor communication across interests and identities adds to that and combines with experiences of little trust amongst each other and in the constructive capacity of the local realm as such (e.g. the concession to multinational operations) and the widely quoted issue of resource misappropriation, non-compliance with norms and legal framework as well as low transparency in the execution of local projects. These contradiction shows how powerful the dominant modern logic, which expressed e.g. in an extractivist and colonialist way, limits the scope of the possible and probable. Even when innovative

projects are designed and expressed, they are rendered into the realm of the impossible or improbable. This argument is supported by the responses on innovation, almost no subjective narratives ties in innovative activity with the local actors identified. Mostly, it is expressed as the generation of novel ways in order to increase added value of prime materials useful for monetary cost-efficiency in economic operations. At the same time, however, this notion of innovation is changing. Rural actors have increasingly manifested the value of empirical knowledge for the academic realm. In terms of "non-practical" academics, innovation is connected to the approach to local education, away from mere technological "upgrade" towards pillars like critical lecture and thinking, global exchange and inclusion of arts and humanities.

The issue of time has turned out as a defining landscape element embedding the sociotechnical regime in two ways. The first is a more general statement contained in a number of narratives about the role of time in societal processes, turning transformation into an inherent consequence of "time". This seemingly simple statement has implications for local policymaking, however. Its increasing consideration translates into calls for decision making that projects the city on a long run and is considered a driver for short-term planning, including practices that are non-beneficial for the larger realm, such as corruption and non-implementation of objectives. Social conflict adds to that, and continues to define the lifeworld of the present. Interest groups fail to rearticulate themselves in the realm of the community and pursue policies in self-interest. This translates into a strong monopolization of governance and productive activity, prevents participation and seeds mistrust, which does not nurture a culture of innovation but corruption, the later regarded as forming part of focusing on concentrated and short-term return. Secondly, reconsidering the mechanisms both of understanding the territory (history) as well as of projecting it (scaling of local projects) is crucial in breaking this vicious cycle by dislocation and reattribution of social meaning. The historical treatment of discursive phenomena, which can furthermore help to mark their ending and work with respective lessons. Simultaneously, the redefinition of the scope of history and related myths expands the basis for local identity and potentially brings forward interesting findings about ancient procedures that might inspire innovation in the future.

4.3.2 Practical implications for the results of data analysis

In order to dive into the practical discussion, we can start with the local meaning of sustainability as a basic meta-narrative, which highlight the role of economic sectors and activities that are possible to be maintained on the long run, as well as activities that are targeted at preserving the territories environment, increasing social well-being and mental health as well as generating long-term benefit for the region. Petroleum as representing Barrancabermeja's landscape has been brought forward by the previous chapter. Furthermore, it has been stated that this meaning is finding itself in times of dislocation. The discursive struggle to redefine the landscape of Barrancabermeja's sociotechnical regime expresses in economic, environmental and social crisis discourses that are derived from the implications of a century of fossil fuel extraction and corresponding subjective experiences. And this

struggle for direction reflects not only in the theoretical but practical realm – globally, the increasing depletion and recognition of the finite character of unrenewable natural resources are translating into "two mega-trends" in land-use and decision making: A trend towards depleting what is left and a trend race for securing production capacities of renewable resources (Kröger, 2014).

This means to carefully think about making investments into fossil resource production in the territory. In terms of the transformation of productive activity, first of all, it has to be clear that our contemporary socio-metabolic regime is running on fossil resources that are extracted and converted into gas emissions and plastics, in other words, that are used in a linear fashion (without disappearing at the end). While large parts of it are burned in order to generate energy, petroleum is a resource that is used for a vast range of goods, such as medicaments or cosmetics. It has to be clear as well, that fossil resources are finite. Beyond the peak-oil theory from the 50th it is not entirely clear, when it will be used up and non-conventional gas extraction represents an expansion of extractable volumes. It will, however, end at some point (IWR, 2019). Investments and concessions should therefore be made looking back into the present from this point in the future. How will present investments transform? Here, we need to consider the type of knowledge and work that is required, as well as external costs generated. Work in the oil industry implies high health risks (ILO, 2017) and in the local context of temporary work contracts it implies labour market insecurities. Innovation in this sector is mainly driven by the company and its research institute. Furthermore, it requires complex infrastructure and its maintenance. Petroleum extracting territories are facing extreme health impacts, which is reflected in the quality of water, air and high degrees of irreversible environmental impacts, which are going to raise costs in the future, either for recuperation or water sanitation. In this regard the frequency of oil spills and operational irregularities has to be considered, too.

The meta-narrative furthermore is marked by a call to diversify productive activity, both from proponents as well as opponents of the petroleum industry. With regard to the narrative strands presented above, the promotion of alternative productive sectors in the local realm should be based on the integration of these strands (referred to as meta-narrative by Roe, 1994). From this integrated point of view, emergent productive sectors can promote and benefit from social diversity on the local level. At the moment, paradoxically, despite the call for diversifying and enhancing local economic activity, certain productive sectors are "forced to disappear", which causes the opposite. Especially rural activities are important for providing the double task of managing environmental resources (Law 99), producing agrarian goods and maintaining or creating territorial immaterial culture.

The integration of empiric and scientific knowledge production on the academic level is something that has been promoted by several actors in the territory and is a third component of a meta-narrative. This responds to local challenges that express through the narratives, e.g. setting up local productive sectors, providing education and higher education affordably and accessibly, creating local value or integrating fragmented interests. This aspect should be pursued more strategically and build the central pillar of the sociotechnical regime for several reasons. The first reason responds to the

diversification of local productive sectors as mentioned beforehand. Already, Barrancabermeja has a good infrastructure of educational institutions, a lot of which increasingly recognize the potential of integrating empirical knowledge into the process of knowledge production. While certain subjects viewed the production of knowledge for economic purpose critically, turning this into the production of knowledge for promoting local productive activity can behold the foundations for potential productive futures. To give some examples, rural actors in Barrancabermeja have been setting up projects with farmers, in which scientific agricultural knowledge is combined with empirical knowledge and practically implemented and tested. That way, the rural contributes knowledge (and immediately tests it) to the 53 academic and vice versa.

But the establishment of productive networks for rural actors requires more than that: what type of material and institutional infrastructure is needed to create local "added value", a crucial point articulated in the interviews? This process implies road infrastructure that serves the specific geographic requirements, which is where local asphalt innovation play a role, in which urban planning and architecture plays a role for renovating the ancient market hall, in which transportation play a role. Talking about urban planning and architecture: (re)construction holds a lot of potential for creating economic surplus. How could these academic and practical disciplines benefit from historic knowledge about the territory's identity? How can this project of renovation be integrated with recent efforts of building a technology park for promoting local innovation? Thinkable is to turn e.g. the old hospital San Rafael into a multi-purpose space, offering office space for start-ups connected the local STI-project for promoting digital and emergent businesses. It could represent a place for offering the often-required mentoring and supervision of the implementation of local projects and emergent businesses. It could be a place that offers related courses, such as the Punto Vive Digital, that could provide further IT courses there. While a technological park is a great idea, respective financial resources could be targeted more efficiently using already existing infrastructure and renovating public space at the same time.

A similar potential could be the targeting of local service provision. As the recuperation of water definitely accounts as an emergent sector, these aspects could be integrated in something similar to a utility board that supervises the process of local service provision, such as water and wastewater management, waste management, electricity infrastructure and provision and similar. This, too, would create a circle of academic (scientific/empirical) knowledge production in the territory and its immediate application. Especially the issue of waste management beholds a lot of potential for improvement, especially regarding the process of waste recycling. But similarly, water management represents a process that can include rural actors (preserving quality of water bodies), scientific knowledge and current operators alike. Also, the provision of household electricity holds potential. With twelve hours of intense sunshine every day, the "tierra del sol" has a lot to exploit – not only can the sun power households all over, it could be target for technological innovation. And sunspills are nowhere near as dangerous and impactful compared to similar incidents in the petroleum industry. Finding alternative modes of energy production is an emergent trend that has been pursued in the territory, but which should

be promoted more progressively. Having a gigantic energy producer with a research laboratory is an asset and corresponding actors should start to push into new economic and scientific directions. Several small solar parks throughout the territory would not have the same effect on the project of agricultural activity as well as on spots for recreational activities and tourism as petroleum extraction sites and fracking operations. Recreational cabins in the woods will not attract visitors if the surroundings are contaminated and the tap water is not drinkable. There are actors in the territory that are experienced with interregional or international cooperation in project management, as was expressed during interviews and conversations. The exchange of knowledge and experience on local productive sectors, public service provision, structural change etc. 54 is especially at times of worldwide communication infrastructure a huge potential. This can range from the simple exchange of best practise or experience to knowledge exchange and transfer as well as transnational partnerships and the temporal exchange of work force and/ or students. A topic that has been touched throughout the above examples is the consideration of creating circular productive networks in order to build a sound basis for the fluctuations of an economic sector that is highly dependent on global market dynamics. This means that exploit the potential of territorial knowledge and establish required infrastructure. The discussion could continue for pages. The purpose of discussing the subjective narratives in light of the territorial condition can visualise possibilities and capabilities for creating and further pursuing territorial strategies on the long run. Putting narratives into the perspective of the logic or knowledge they are informed by can unmask different directions for thought and action. Furthermore, the discussion is up to investigation itself, further pursuing, how can we proceed? For example, take the issue of deforestation, which will become severe with global warming, contributes to bad air quality etc., and take the strong presence of cattle farmers in the rural area. Now with the results of the narrative analysis, the question would be: How is cattle farming and sustainable forestry as well as reforestation compatible and in what ways would it even complement each other? How can we generate novel knowledge on this, integrating empirical knowledge producers and scientific institutions? What does this mean for the future of these productive sectors? If we utilize local narratives in this way, we can generate insights that help to stretch and transform innovative activity and sociotechnical regimes in order to adapt to present and future challenges, instead of only making it fit and conform and thereby partly shifting and inflating present problems into the future, in order to “see these people live like they deserve to.” (PC)

V. CONCLUSION

In order to finalize this research with some concluding remarks, we start with de Sousa Santos phrase: “The will to challenges surpasses the challenge of will” (2002, p. 34), which is a good reminder to not be afraid of anything that looks too big, too dark, too challenging, too irrational. It is a sentence to remember when everything else says: “There is not future”, something I heard all too often during my stay in Barrancabermeja. The future surely will come (as it does at any given moment); the only question is how we plant it in the present. Both theory and empirical data have taught about the strange factor of time that you cannot work against, that brings forward events that have to be arranged in some subjectively meaningful or useful way. In Barrancabermeja, a lot of events that time had brought have been hard to put into logical order and most of the corresponding decisions were not taken in the territory, one can think about the industrialization and about its infliction with violence. Both are arguably a thing of the past, the later more than the former, and as participant J described, their transformation is subject to decisions that are being taken and to time. It is subject to moving through time but with a vision, because in Barrancabermeja, in order to paraphrase a participant “we have everything! We are only missing of knowing where we are going” (PA). The conclusion starts with discussing the generated answers to the research question. It will then engage in a reflection about the findings and the limitations the research (design) has generated. Afterwards, recommendations for local policymaking will be drawn and future directions for research are going to be made.

5.1 Addressing the research question

This research was informed by the question of how subjective narratives about the territorial past and present can give information about emergent transformations towards a sustainable local economy. Before addressing the *how* in the next paragraph, the sub questions are going to be amswered. Firstly, the research was interested in subjective narratives about the territory of Barrancabermeja, which were limited to the territorial opportunities and challenges, local innovation, the role of knowledge and dreams about the future. The question was interested in the content of these narratives and recoded these findings in terms of de Sousa Santos’ five logics of knowledge reproduction. With the theoretical background in mind, the results were presented according to appearing discursive elements and their meaning within the subjectively perceived local context.

This question asked for the content of the subjective narratives. The study identified petroleum and the corresponding industry infrastructure to be the main component of close to every narrative about the territory. This means that every element of the sociotechnical regime more or less expresses in connection to the fossil resource and extractivist activities. Furthermore, these narratives all express a sense of uncertainty about the future that is given by past experiences with a highly unstable local economy. This translates into two narrative strands: Innovating the extractivist sector in terms of non-conventional fossil resource extraction and the second is the diversification of the local economy. Furthermore, productive activity is narrated as governed by monopolies and corresponding actors, which

gives citizens (as productive subjects) little room to act or paradoxically forces certain economic activities to disappear. On the other hand, diversifying the economy has been expressed as a complicated task, given territorial possibilities, capabilities and past experience. Next up, close to every subject narrated the territory of Barrancabermeja as a socially colourful place where work migration and rural migration over the years has led to a high degree of cultural diversity, which reflects in the organization of different interests in social movements, associations and federations. At the same time, the territory is referred to as fragmented and conflictive, as these opposing interests are seldomly overcome, statements like "We still have not learned to live in a group, live in one nucleus, instead everyone goes for his project" (PJ) were a common way to introduce the social 56 order. In the realm of social order, the issue of governance has been a central and delicate point in territorial narratives. "The state" was portrayed as an external element that plays a huge role in the present condition of the territory that also officials from the municipal offices referred to as such. It was narrated as opposing the creation of the common good by intransparent decision-making, by poor investment or misappropriation of financial resources, by instrumentalising political discourse and by non-compliance with the law. Finally, the issue of governance is also marked by economic actors taking over governmental tasks like the provision of health, education and public infrastructure. Furthermore, the narratives show that a high value and potential is assigned to knowledge production. While innovation is an activity that is not predominantly associated with the territory, apart from company-driven high technological innovation for the petroleum sector, the production of knowledge is regarded as key for generating local value as well as for the pursuit of economic alternatives.

The narratives showed an emergent orientation (a few organisations are more strongly involved than others) of the academics towards the rural in terms of accessibility and direction of academic work. Apart from that, the process or paradigm of knowledge production is moving towards creating synergies between empirical knowledge producers and scientific knowledge producers. Apart from that, the narratives talk about the direction of knowledge production, where the importance to conduct academic activity not solely for the economic purpose is highlighted as a key factor for the quality of life and wellbeing of the territory. Respective subjects promote art and humanities within the territory. Furthermore, we want to mention that time is narrated as a crucial factor for societal transformation. In terms of the past, time seems to predominantly begin with the initiation of fossil resource extraction, which focusses historical "lessons" on the industrial period and the times of the civil war. There is a strong emergent notion of projecting policy projects on a long run. There is, however, and emergent conviction that historical research needs to look way back into the past in order to understand territorial identities and derive insights about how people used to interact with the territory. The future, on the other hand, is usually narrated as obscure and lacking a clear vision. Lastly, sustainability is economically scaled, as maintaining activity over time. It is also referred to as the preservation of our habitat, of maintaining it healthy for now and future generations. Apart from that, it is interpreted as

social welfare, as providing livelihood for citizens of the territory and thereby increasing well-being and mental health.

The second sub question was directed at connecting the research findings to the local practical realm - what are the consequences of these findings for local decision-making? It is generally recommended to make investments into innovative projects that respond to the narratives presented above. This means concretely to approach local issues from an empirical and scientific perspective in order to further promote territorial knowledge production, where rural and urban actors support the scientific process and science reaches the spheres respectively. This shall amplify the process of innovative activity that produces solutions that fit territorial conditions by integrating disciplines. These projects should be financed by the STI-royalty fund and accompanied by close mentoring and supervision, e.g. by the TIC secretary as in a previous project for promoting entrepreneurial activities. Such efforts have to be expanded and their execution should be improved in order to create local businesses that strengthen alternative sectors to industrial petroleum extraction. In this realm, investments should especially target knowledge about ecosystem treatment and recovery. Ecosystems do deliver services; this has to be recognized and considered in strategic planning. If ecosystems are not preserved, the service they (will no longer be able to) provide will increase costs in the future. These systems include e.g. fresh water, air and climate as well as the absence of disease. This is drastically underestimated by current decisionmakers. Another crucial point is investment into public infrastructure. This includes infrastructure such as roads to rural areas that should be oriented towards strengthening local markets, beginning with regional food. Concessions should be made to local companies which strengthens innovation (e.g. in the improvement of materials that respond to territorial conditions). This simultaneously includes the construction of circular processes for resource treatment, talking about e.g. waste management, wastewater sanitation, and electricity generation and similar. These areas require workforce and knowledge and provide public services. The municipality should take on the task of setting up operations that are functioning on the long run. This does not mean that partnerships with private actors cannot be made, but the Rediba-case represents a disastrous example for the consequences of assigning public service tasks to actors without establishing a smart operating system to support this. This includes the use of plastic in everyday life, which creates huge amounts of waste, which is not recycled, but simply disposed “elsewhere”. A local utility board can be a starting point, because such an operation requires local staff, respective knowledge and creates productive dynamics on a long run. Then, the construction of local infrastructure should take into account existing potential and restore places of historic meaning, instead of building new in the first place. It is more cost efficient, integrates into urban picture and promotes immaterial cultural heritage.

5.3 Research findings and limitations

The research findings support the role of the landscape in sociotechnical transitions in two ways. It pointed out, how the articulation of sociotechnical regimes are subject to the landscaper and inform

the naturalized nature of things. This has implications for the understanding and chances of innovation to be developed and to diffuse. Furthermore, the findings support the role of discursive articulation of sociotechnical regimes and the value of integrating this perspective with the multilevel perspective. Other than that, an in-depth investigation of local narratives from a knowledge sociological perspective creates a sensitivity about the hegemonic (re)production of knowledge and helps to expand the objective basis for considerations about future productive potential and necessary activities of innovation.[9] This gives an to the overall research question and its *how.* A focus on logics of hegemonic (re)production of knowledge delivers a framework that allows to focus on the way in which narratives connect to the epistemic foundations they are built on. Hence, it is a good tool to explore belief, imagination and such, because these variables are not quantifiable and measurable. On the other hand, this limits the quantity of statistically useful data that can be generated. It rather allows to follow an exploratory research design, where the interest is rather in building the basis for future work. If the interest lies more in generating statistical data, which can be useful to make statements about how often certain narratives emerge or in what local areas etc., then a reduced interview instrument in the form of a questionnaire instead of a semi-structured in-depth interview can build the basis for e.g. analyzing the data with Q-method (as suggested as well by Hermwille, 2016). In this case, the interest was rather on testing out the practical potential of the highly theoretical discourse theory for sociotechnical research as well as on exploring the notion of the narrative and its meaning for transformative change. The approach has shown that it is valuable to take over such a rather post-structuralist perspective for this purpose. The findings contribute not only a small piece to sociotechnical research into different directions, spheres and cases as suggested by Geels, but to the recent interest in the function of narratives for political decision making. It would be interesting to see, how these dynamics play out in other cases, in order to compare approaches and findings to address limitations given by the circumstances of the researcher position and the scope of this research.

5.4 Recommendations and directions for local decision making

All thinkable recommendations are permeated by considerations about local governance. If we are talking about investments, of course they do not serve their purpose if they do not arrive at their destination or involve an excessive bureaucratic process. All economic and productive emergencies cannot be pursued if turned down by corruption. An example is the circumstance that the investment into good education and critical lecture is promoted from every subject position in the local realm, contrasting with a recent case of a high school directorate misappropriating the institution's financial resources. Another example is the ever-increasing complexity of local leadership, ranging from severe fraud and unlawful behaviour by those who set the law. It is highly recommended to introduce

[9] In order to explain this point; Heinz von Förster would compare this act to turning the head a little bit to the side in order to correct the blind spot in our eyes and further approach a completion of the whole picture, in order to somewhat mediate our naturally given blindness.

mechanisms that hold public actors accountable to budget plans. Respective supervision must include independent measures and control, blockchain technology, for example, is a simple tool that might be considered and help to break this cycle.[10] The practical discussion (Chapter 4.3.2) delivered some reflections about how to make practical use of the narratives identified. Connecting the discursive elements can, as shown, lead to considerations about other directions in problem-solving, and inform the construction of knowledge producing disciplines to explore alternative solutions and respective innovation. Examples are the reconstruction of local architecture to serve the purpose of cost-efficient project implementation, such as the technology park or creating a place for emergent business-related teaching and accompaniment. Another example would be the integrated approach to local problems, such as pollution, which touches the issue of e.g. water sanitation, waste management, translating into long-term job creation and the need for technical and specialised knowledge. Or take the construction of a strong local food production and consumption circle, which alleviates producers of existential struggles, promotes their role for local culture and knowledge, motivates the creation of infrastructure, connects in turn to promoting and preserving ecosystem services and attracts visitors, and so on.

As becomes clear, these recommendations are just examples for how the research findings can be used for planting sustainable transformation processes on the local level. Then, this study wants to motivate decision makers to empower local social actors, who are extremely well organized and dedicated in the promotion of their interests and proposal of creative solutions for their specific challenges in the local realm. A recommendation would be to construct a corresponding process with the beginning of the next budgeting phase after 2019. Based on the narratives of different social actors, a common policy objective should be formulated which should then be translated in royalty projects in the realm of these social groups, accompanied with a strategic plan for the formulation and implementation of these projects over the length of the budget phase, but designed to enter a new phase with the beginning of the new electoral and budgeting phase. Local decision makers should seriously engage in projecting the future of the city which corresponds to the needs of its citizens. The opposite might come at high costs in the future, which starts to be evident already. The construction of a post-carbon, post-conflict is a project that offers Barrancabermeja, a town that has been constructed as an industry site and suffered the consequences of decisions taken elsewhere. These times of societal transformation are challenging, but they offer an opportunity to live up to image claims as an ecocity of energy and water, amongst other outlooks, and serve as a global example for structural change.[11] This involves not only policymakers as decision makers, but simultaneously requires significant investments on the side of economic actors like Ecopetrol, who should increase capacities in corporate change

[10] Of course, this requires careful research about the conditions of implementation. For comparable experiences, see for instance https://www.transparency.org/news/feature/blockchain_bitcoin_and_the_fight_against_corruption, or https://www.weforum.org/agenda/2018/03/will-blockchain-curb-corruption/

[11] Structural change always looks idealistic in the first place. Turning the German Rhein-Ruhr-area from a coal-extractive site to a knowledge-based site is an example. Who would have dared to tell a coal worker that one day, music and art festivals are going to dominate the industrial infrastructure, with dancing people and bright lights all around e.g. the gasometer?

management and renewable energy strategies. Local producers of knowledge should unite more strongly and target their specific expertise towards common objectives. How can local infrastructure change be successful? Comparative studies with global experiences are recommended in order to identify common and differing challenges. Knowledge transfer between respective organisations from other places in the world struggling or succeeding with sustainability transformations can increase the velocity in this regard. As pointed out above, more investments should be made into territorial specific knowledge on how to adapt to sustainability challenges.

Even though the territory is now imposed with fracking pilot projects, local efforts should not cease to diversify productive activities and promote sustainable futures. Not only biology teaches us and shows us that macrostructure, collective action, sociotechnical regimes, all this is the result of emergence. The transformation of modern society is imaginable, it is possible, we just have to plant, water and let grow.

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