

Towards a Neutral North

Identifying factors that drive a municipality to actively propel a low carbon transition: A case study of Akureyri, Iceland

Rakel Sigurveig Kristjánsdóttir

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Supervisor: Henner Busch, LUCSUS, Lund University

Abstract:

Lowering global carbon emission is one of the most pressing issues of our time. A rising interest in the role of cities in lowering emissions has been detected. Although urban areas are active entities in the production of carbon emissions they are also potential hubs for designing and implementing solutions. Such processes has been referred to as urban low carbon transitions (ULCT) by academics. In this thesis I investigate the ULCT currently underway in Akureyri, Iceland. The main aspects of that transition has been an emergence of a persistent niche and creation of an official municipal 'carbon neutral Akureyri strategy' (CNAS). Analysing this I utilise transition theories, multilevel perspective (MLP) framework as well as a newer ULCT framework for further understanding of city transitions. With empirical data from 19 interviews with relevant interdisciplinary actors I identify CNAS precursors, transition trends as well as actors' perceived driving forces and success factors. Transitions are known to be driven by multitude of factors and causality is rarely simple and this study is no exception. Results show the main driving forces are active and enthusiastic individuals and municipal branding possibilities. Success factors being mainly close community connections, strong public- private partnerships and stable local political support for green initiatives. The socio-technical system of carbon flows in Akureyri is has connected local waste management and transport regimes through fuel production. A presence of an active intermediary, Vistorka Ltd. functions to support niche innovations affecting carbon flows. The intermediary is propelled by two identified 'transition champions' in Akureyri. Some unique underlying factors were found, such as underlying culture environmental surroundings, yet many aspects can be generalised and thus have some instrumental value as a case to learn from and upscale for further transitions.

Keywords: Urban transition, Akureyri, agency, change champions, green image, political support, community connection.

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List of Abbreviations

CNAS	carbon neutral Akureyri strategy
EC	environment committee
ECC	environment and construction committee
ETP	environment and transportation policy
ETT	energy transition in transport
GHG	greenhouse gases
GN	Gámaþjónusta Norðurlands
IPCC	intergovernmental panel on climate change
NO	Norðurorka
SS	sustainability science
ULCT	urban low carbon transition
ULL	urban living labs
UNAK	University of Akureyri

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1 Introduction

1.1 Sustainability Problem

As the international science community has come to a consensus on the urgency of lowering carbon emissions (IPCC, 2014), to avoid disastrous climate change, societies are faced with the complexity of mitigation efforts. As the intergovernmental panel on climate change (IPCC) made clear to policy makers (2014) the problem of climate change is fundamentally that it represents a global collective action problem. Therefore solutions must be collectively developed, yet this has proven hard to achieve, resulting in a more decentralised approach taken over the past two decades, focusing on national and regional approaches (Bulkeley, Broto, Hodson, & Marvin, 2013).

1.2 Cities as Hubs of Sustainable Transitions

Reaching a state where human societies emit low amounts of carbon, yet still function economically and fulfil social needs, is a desired one. In an attempt to mitigate climate change, the question of how individual countries and cities plan to reduce their emissions is gaining more traction (Nevens, Frantzeskaki, Gorissen, & Loorbach, 2013). Urban areas now harbour over half of the world's population (United Nations, 2014) and are the main arenas of economic activity. This creates a possibility for cities as potential arenas for sustainable transitions (Nevens, et al., 2013). Since global urbanisation is predicted to rapidly increase (Grimm et al., 2015), advancement in cities' abilities to functionally transition to low carbon economies is essential (Bulkeley et al., 2013). Research on cities that represent such 'hubs of change' and outlining the dynamics of urban sustainability governance is increasingly emerging (Bulkeley et al., 2015), for example through the study of urban living labs (ULLs) (Evans & Karvonen, 2013; McCormick, Anderberg, Coenen, & Neij, 2013; Voytenko, McCormick, Evans, & Schliwa, 2016). Additionally a new conceptual framework has been developed by Bulkeley and colleagues (2013) to understand low carbon transitions within cities' infrastructure networks in response to climate change. There they show the degree of inevitability of urban transitions as well as their dynamic complexity.

1.3 The Potential of Iceland, Akureyri

The nation of Iceland is in a particularly interesting position in terms of reaching low carbon economy due to its renewable local energy systems, electricity and district heating, from hydro and geothermal sources (National Energy Authority, 2009). Most transition research has focused on

studying shifts to clean nation wide energy systems as those sectors presents the largest emissions (Busch & McCormick, 2014; Kern & Smith, 2008), and the biggest barrier in achieving low carbon economy (Dhakal, 2013). This gives Iceland an advantage as the energy aspect is already achieved and the government has ratified the Paris COP21 agreement to reduce emissions by 40% by 2030 from 1990 levels (Ministry for the Environment and Natural Resources, 2016). The country's largest emissions come from industry (Davíðsdóttir, 2017) yet because over 70% of the population live in urban areas, with more than 10,000 inhabitants (Statistics Iceland, n.d.), advancing a low carbon transition in municipalities is relevant.

Due to a small population, Iceland represents a small fraction of the global emissions. Nevertheless, with the green energy system in place, Iceland arguably has the potential to become the world's first net carbon neutral country in the world. Therein lies Iceland's greatest contribution, to function as a 'test bed' for carbon neutral function and even as a knowledge hub for low carbon transitions. Furthermore the importance of small municipalities should not be neglected as they present a potential for testing new ambitious governance models in transition (Späth & Rohrer, 2013). Therefore an increased understanding of how transitions within municipalities takes place is called for. Assessments have shown that Iceland has great potential to lower its current greenhouse gas (GHG) emissions considerably (Davíðsdóttir et. al., 2009). With persistence in implementations, letting firm actions match ambitious words, this should be possible.

Thus the question becomes this: If an Icelandic municipality, with above mentioned advantages, can not achieve carbon neutrality, then where can it be done? This should be achievable yet this transition is far from underway in Iceland's biggest municipalities. Understanding what drives transitions in Iceland is needed and can be done by studying the place that has come the farthest. There, a research gap is present.

The front-runner in the active implementation of low carbon initiatives is the town of Akureyri in Northern Iceland. This thesis focuses on this municipality and the transition currently taking place. The mystery here is why Akureyri has achieved this path of urban low carbon transition while other municipalities in Iceland have not. What makes it stand out? What drives their transition? Certain factors have contributed to the success in Akureyri, more so than others, according to individuals involved in the transition. An outline of these factors, and their dynamics, is provided in this thesis.

1.4. Aim and Research Questions

Understanding what drives Akureyri to actively pursue net carbon neutralisation is imperative for their environmental strategy's further successes, as well as possibilities to upscale this transition nationwide. Both drivers and success factors of this transition are identified and analysed. My primary aim with this thesis is to fill a knowledge gap by producing new knowledge of municipal low carbon transitions and what drives them and try to shed light on factors aiding success in Akureyri's transition. I deem it important to identify the drivers and underlying conditions that have made this transition possible. My secondary aim is to maximise learning from Akureyri's process to enable further success. In that regard this is an instrumental case study, for the findings can be generalised to be of practical use for municipal governance bodies, decision makers and perhaps businesses. Finding this I answer the following overarching question:

What determines a small municipality's ability to actively advance low carbon transition?

To answer this question I will look into the case of Akureyri, Iceland by answering the following sub research questions (RQs):

- 1: What are the past and current developments and dynamics in Akureyri's low carbon transition? (trends)
- 2: What are the motivations that have driven the implementation of this low carbon transition in Akureyri? (drivers)
- 3: How have local governance structures and resources been used to facilitate the low carbon transition in Akureyri? (success factors)

Studying this transition I limit myself to identifying trends, drivers and key success factors, in Akureyri, without analysing specifically how those could aid a transition elsewhere. Although I do hope that Akureyri's advances can be duplicated in other municipalities, for the benefit of all, a comparison of how that could be done is in itself a topic for another thesis.

1.5 Outline

The paper is divided into six chapters. First one being this past introduction followed by this thesis contributions to sustainability science. Chapter two further details the research context and relevant background. The third chapter describes the methodology in terms of explaining the research methods and how primary data was collected and analysed. Chapter four lays out the thesis' analytical framework including the chosen theories. Finally, the fifth chapter explains findings of the

research and includes discussion that connects results back to theory with the sixth outlining a conclusion and providing suggestions for future research.

1.6 Explicit Contribution to Sustainability Science

Sustainability Science (SS) as a field advocates transdisciplinary co-operations by connecting natural- and social sciences to find sustainable solutions to urgent and global problems (Jerneck et al., 2011; Kates, 2011). GHG emissions' affect on rising global temperatures are well defined understood (IPCC, 2013) and represent a pressing sustainability problem. Yet solution processes reveal this to be a 'wicked problem', which are difficult to manage without creating further problems (Brown, Harris & Russell, 2010). On a global systems scale the prevalent use of fossil fuels, in virtually all sectors, is a socio-technical problem, in that it requires a technical element yet must be met with the social aspects in mind to be sustainable. Overcoming wicked problems is a function of SS by merging the natural with the social. Furthermore a solution-based approach has been argued for, within SS, to prevent the field getting stuck in problem analysis with little practical outcome (Miller et al., 2014). Transition studies are ideal to produce valuable lessons for sustainable futures. Identifying and understanding drivers and success factors of Akureyri's transition provides important practical knowledge which is central for societal decision-making (Miller, 2013, p. 279). Additionally such studies present an important learning opportunity for the transition literature as a test-site¹ for social and technical innovations (Bulkeley et al., 2015; Nevens et al., 2013). Akureyri represents a dynamic and interesting arena capable of furthering knowledge on what drives transitions which is valuable for SS.

2 Research Context

The following section provides necessary case context for the transition in Akureyri. Historic events pertinent to the transition are valuable as they help to build a picture of the on going transition by illuminating precursory leverage points.

¹ Test-site, test-bed, or hubs are urban transition concepts for a defined location of transition.

2.1 Akureyri Context

Akureyri is the largest municipality outside the capital area of Iceland, with a greater area population of 20,000 (Statistics Iceland, n.d.). It has a high level of infrastructure with: ten primary/secondary schools, two sports clubs, one ice skating hall, four swimming pools, along with a state run public airport, hospital and a University (UNAK). The reasons for this relative infrastructure density are multiple, the most prominent one being that the municipality's isolation from other large urban areas thus having to providing services to many inhabitants of the North and North East of Iceland.

2.1.1 Previous socio-technical system transition

The current socio-technical transition in Akureyri is not the municipality's first transition as the country underwent a district heating energy source transition in the 20th century. A change to geothermal district heating systems in Iceland was initiated in Reykjavík in the 1930's (Barðadóttir, Ragnarsson, & Helgason, 2003). This transition took time and in 1971 98% of Reykjavík's houses had been converted to geothermal heating (Resource Park, n.d.). The current ratio of geothermal district heating nationally is around 90%, the rest using electricity and oil (Orkusetur, 2017). However, this development was conducted later in Akureyri since the geological conditions were not considered optimal for geothermal drilling (National Energy Authority, 1979). Thus the municipality's transition to coordinate geothermal district heating systems occurred in the late 1970'a and early 80's, after the global oil crisis. This transition is pertinent to this study since it represents a previous large scale socio-technical transition and is referred to, by a change agent in Akureyri, as the first energy transition in Akureyri. Such infrastructure intensive transitions have been detailed by academics, using theoretical frameworks, such as the Netherlands' transition in the 60's with their change of district heating systems from coal to gas (Rotman, Kemp, & Van Asselt, 2001). This is not unlike Akureyri's district heating transition where the shift was from oil and electricity to geothermal sources.

Current systems transitions in Akureyri are the waste management sector, in terms of recycling and drainage systems, with the next big transition being energy transition in transport (ETT). The latter being what influential key actors in Akureyri recognise as much easier and cheaper to achieve than the previous district heating transition, calling it the second energy transition in Akureyri.

2.2 Concept Introduction and Precursors to Strategic Transition

The city of Akureyri, is currently in the forefront of low carbon municipal initiatives due to the various projects carried out by official or private entities (see figure 1 below) as well as systematically implemented projects under the municipal ‘carbon neutral Akureyri strategy’ (hence CNAS).

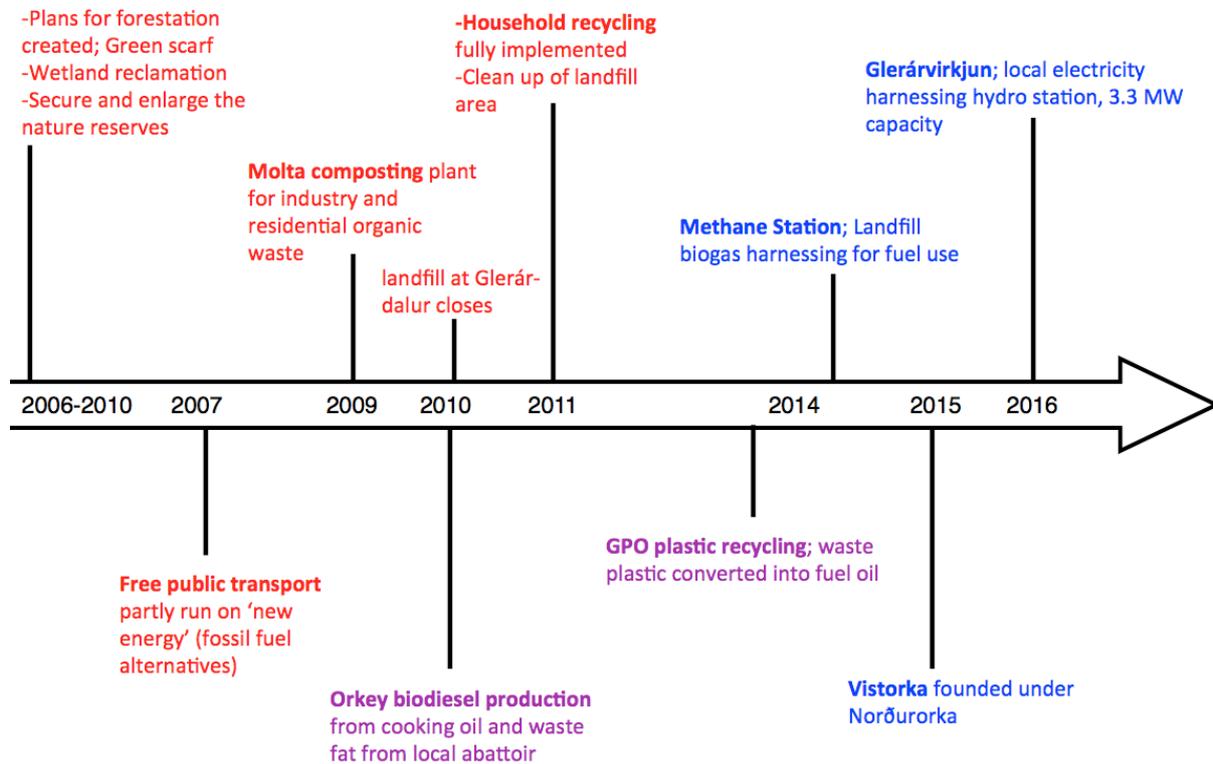


Figure 1. Outline of precursory initiatives in a timeline. Red is initiatives carried out by municipal governing bodies, blue by the local energy and utility company Norðurorka (NO), and purple by private businesses

These actions, seen in figure 1, assist in the municipality’s transition and are viewed as its unintentional beginning stages, precursors, as they were implemented before the creation of a coherent municipal carbon neutralisation strategy. At the heart of the municipality’s current efforts in reaching carbon neutrality in accordance with CNAS is Vistorka Ltd. Founded in may 2015 Vistorka is a Ltd. company owned by Norðurorka PLC (hence NO), the local energy and utility distribution company which is in turn largely owned by Akureyri municipality (see figure 2). CNAS is laid out in the municipality’s newly published ‘environment and transport policy’ (hence ETP)(Akureyri municipality, 2016). All municipal environmental policies, since 1999, have largely built on the continuous local agenda 21 municipal work and the same goes for the new ETP according to public officials in Akureyri. However the ETP covers more than just tasks concerning CNAS, other general

environmental policies, such as plans to mend the municipal sewage drainage systems which presents a clear technical problem with environmental consequences for the fjord according to many actors.

Vistorka's CEO Guðmundur Haukur Sigurðarson (hence referred to as Guðmundur) was involved in the design and development of many processes vital to companies, now involved in CNAS, from 2007 onwards, before Vistorka's creation. These companies were later put under the umbrella of Vistorka. At the time Guðmundur was employed at a local engineering firm which had been hired to oversee the engineering of these company's technical processes and thus he was very familiar with these companies well before the concept development of CNAS.

There Guðmundur worked with Orkusetur's CEO Sigurður I. Friðleifsson (hence referred to as Sigurður), starting when the latter presented Akureyri's situation concerning matters of climate back in 2007. Orkusetur is an independent and autonomous entity which promotes and assists projects of increasing efficiency in energy usage, exploring new energiser and providing educational material (Orkusetur, 2017). From there on the concept of Vistorka was slowly developed, by Guðmundur and Sigurður, until it became a reality in 2015. Their working relationship is analysed in chapter 5.2.1 findings and discussion.

2.1.3 The Vistorka Concept

Vistorka assists local initiatives, which all recycle material and produce new products such as compost or fuel, that otherwise would go to waste, while simultaneously lowering carbon emissions. Guðmundur defines the company's role as: "to lower waste, improve utilisation and increase production in Akureyri and the neighbouring Eyjafjörður area". Vistorka works towards aligning innovations and projects in Akureyri, that lower carbon emissions through recycling, and thus advance carbon neutrality.

2.1.4 Introduction to Vistorka's companies

The main stakeholders under this Vistorka umbrella are: Orkey Ltd., GPO Ltd., Molta Ltd., and NO's Methane station. Henceforth referred to without the use of Ltd. Following is a short introduction of each entity, but their theoretical context is analysed in chapter 5.1. Orkey is a production plant that converts used cooking oil (from households, institutions, and restaurants) and animal fat from local abattoir to biodiesel. That product can be used as a combustion enhancer, an additive, or as biodiesel fuel for vehicles. Currently the largest part of their production is sold as combustion enhancer for local fishing trawlers according to Orkey stakeholders. GPO is a small plastic recycling company that

converts waste plastic to oil for fuel use. The company main source of plastic comes from the agricultural sector. Molta is a composting plant that handles organic waste from residents, public institutions and local food producers in North and North-East Iceland. It is largely owned by municipalities in Eyjafjörður area, and the largest shareholder is Akureyri municipality. Some private entities hold smaller shares but the creation of Molta was initiated by private food production firms in Akureyri to recycle organic waste. This was because of new EU legislation on food producers banning all organic waste in landfill as well as a national policy to reduce landfilled organic waste. Lastly NO built a methane station, harnessing biogas from the old local landfill, where it can be utilised as fuel. This captured methane (CH₄) would otherwise be emitted from the landfill but by burning it as fuel it converts to CO₂ emissions, a less potent greenhouse gas (EPA, 2010) thus having less net effect in the atmosphere than if it was not harnessed. Due to the nature of these companies Vistorka works to combine processing streams of local waste management and fuel production. NO is the largest shareholder of Orkey and also holds shares in GPO. A schematic look at the structure of introduced relevant entities involved in the transition in Akureyri and their connections is shown in figure 2 below. Complexity of connection between entities is visible, through board seats and shareholding.

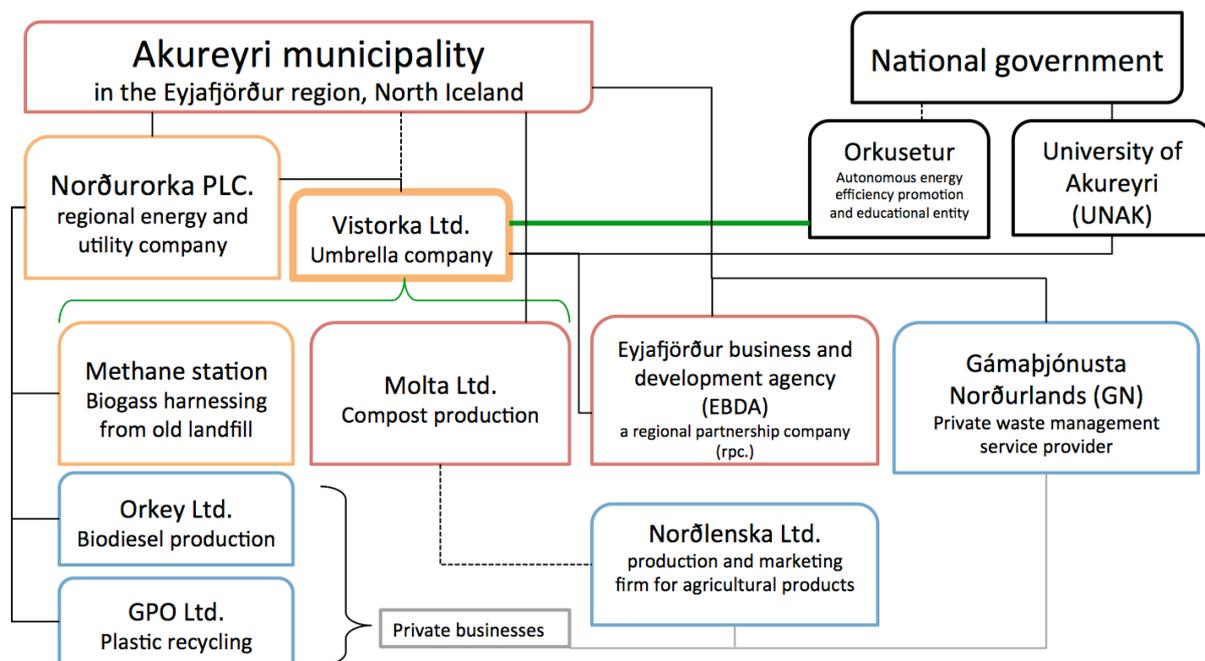


Figure 2. Overview of institution and company roles and their connections, through board membership or shareholding, to main entities in the CNAS in Akureyri. Representatives from main entities displayed here were interviewed. Red are municipality lead businesses, orange projects lead by the energy and utility, blue private businesses, black are state institutions

Other initiatives aided by Vistorka are various municipal projects that either assist the above mentioned companies or are unconnected function to propel the CNAS in other ways. Most all activities connect to either waste management, ETT, carbon offsetting or material sharing with the public. A schematic outline of these initiatives is given in figure 6 in chapter 5.

3 Methodology

3.1 Assumptions

With critical realism in mind, in regards to ontological and epistemological considerations, I do not engage with the 'real' but the 'actual' and 'empirical' for this case. In other words I do not define the real which are the physical attributes of carbon flows of Akureyri's functions, but rather analyse the empirical and the actual (Fairclough, Jessop & Sayer, 2004). The actual being the larger system and it's causal mechanisms and how it came about as experienced by actors making it the empirical. There is an assumptions here that whatever the transition process in Akureyri entails, it is better than doing nothing regarding carbon emissions. That is I do not set out to display calculations of carbon flows which would constitute the real for this case.

3.2 Akureyri Case Study

Akureyri was chosen as a case study site as it is recognised for its efforts in implementing low carbon solutions evident in their CNAS. This is a critical case study as it has: "strategic importance in relation to the general problem" (Flyvbjerg, 2016, p. 229). Additionally this case is a spearheading one and studying such cases reveals potentials for learning since it is not a case of average developments. An adapted use of theory (explained in chapter 4) produces generalised results that can have instrumental value for other places attempting a transition. Finally the amount of infrastructure in Akureyri (explained in chapter 2.1) results in the complexity level of governance being high so it can be seen as a small city despite its size. However it will be referred to as a municipality throughout this thesis.

3.3. Methods of Data Collection

Primary data was gathered through semi structured, in depth, qualitative interviews with chosen actors as the central data set. Various actors from different sectors were approached: politicians, public officials and private business managers. This presents the interdisciplinary aspect of this research as different professional opinions of actors, as well as their personal views as citizens of Akureyri, were engaged.

3.3.1 Interviews

The primary empirical data for this analysis are interviews. In my interviews I looked for the actor's perception of problems and dynamics of the transition as well as general information providing. Each person's perspective is inherently subjective and must be viewed as such. There is value in recognising the actor's own view on what drives the transition, especially those who have been most closely involved in decision making, innovation creation, and project implementation.

Interviews were 19, in total 23.2 hours, conducted in person between the 31st of January and the 27th of February 2017. Interviews were booked for 30 minutes, yet all but two interviews lasted over an hour, as interviewees were informative and generous with their time. This deeper level of engagement than expected suggests increased perceived importance and weight of the topic for interviewed actors (Bryman, 2012). To keep congruence interviews were conducted in Icelandic since the actors competence in English varied. Information on each interview can be found in table 4 appendix A.

The process of choosing who to interview was done through purposive sampling, based largely on the actor's relevance and involvement in initiatives or decision making in Akureyri, as well as availability. Initial 13 interviews were scheduled from their direct relation to Vistorka as interdisciplinary members of the board. From there the six additional interviews were partly decided through snowball sampling, where I was directed to other possible actors with appropriate knowledge by initial interviewees, and partly through further purposive sampling by investigation on site. The snowball samples were taken as suggestions, of actors' relevance to this study, rather than being blindly accepted to keep research focus. Each suggested actor was investigated to evaluate if relevance was deemed sufficient to warrant an interview. Actors interviewed held various positions and can be seen in table 6 appendix B.

All interviews followed an interview guide, shown in appendix C, with some additional questions specifically tailored to actors as well as follow up questions to address emerging points, when necessary, as the semi-structured form allows flexibility (Yin, 2011). The interview guide is divided in four parts: Part I a) an introduction of thesis and objectives by researcher and b) general background information on interviewees and their connection to the transition in Akureyri. Part II was to streamline all interviewees perception of relevant concepts and environmental problems. Since I was not interviewing specialists, with identical experience or knowledge on sustainability issues or environmental problems, I thought it crucial to have a clear idea of how people perceived concepts

differently. Part III consisted of specifically targeted questions for each interviewee's specific knowledge or experience related to the transition, although some questions overlapped between interviews of similarly positioned actors. Finally Part IV was questions specifically to connect the case study transition to theory, although other answers contributed to that connection as all data was analysed through given theoretical frameworks.

Icelandic has a patronymic name system, rather than family names, so it is the custom to refer to a person by their first name. Thus I refer to two key actors by their first name, introduced in chapter 2, due to their relevance and given permission. Otherwise actors are referred to by a generic description of occupational position to disguise those actors not willing to be cited directly in text. All actors however gave their permission to be listed in table 5.

3.3.2 Document analysis

Complementary to that was a document analysis of grey papers and websites, outlining policy formulation, implementation, plans, developments, etc. relative to Akureyri's transition. Selective literature review was conducted of relevant papers, complementary to interviews. Those consisted mainly of grey papers from municipal government bodies, such as policy papers and council meeting minutes, as well as and websites, outlining implementation, plans, developments, etc. relative to Akureyri.

Background research for theoretical positioning was conducted through peer reviewed papers. Literature analysis was executed using the database Google Scholar. It was selected for article accessibility, credibility and relevance. Keywords used for article searches were; "transition theory", "multilevel perspective", "urban living labs", "transition management", "strategic niche development", "urban/city/municipal low carbon transitions", "socio-technical transition".

3.4 Data Analysis

Interviews were translated and transcribed by selective protocol. Analysis by coding and category creation were done with qualitative content analysis (Mayring, 2014, p. 63) through a technique of deductive category assignment (Mayring, 2014, p. 95). Main message of each answer was identified, bolded and categories were created through this process organised in terms of the three sub research question of transition trends, drivers, and success factors shown in tables 1, 3, and 4 in chapter 5. Main findings from each category were identified and analysed deductively from chosen frameworks. Thus the data was explored and viewed through theoretical lenses.

3.5 Limitations

Interviews were conducted in Icelandic, the translation is my own which leaves room for error, although interviewees meaning was retained to the greatest extent possible. It is paramount to keep in mind that primary data for this thesis is interviewees perceptions and are by definition biased and perhaps even inaccurate. This is countered by the fact that relevant actors' perception of the dynamics of the transition are important and relevant in the analysis of this process. Additionally the assumption is that interviewees speak honestly and information gathered from them is pertinent to their specialty and/or role in the transition unless objective is to streamline understanding of concepts. Lack of depth due to time limitations and limited scale of this research, is detected. My own partiality is recognised as I am from Iceland, and do have some indirect connections to the region due to the country's small size, which is basis for bias. However I have never lived or worked in Akureyri and thus come at this case as an outsider.

While this thesis sets out to analyse how a single municipality has created a transition path, it is clear that every municipality has their recourses and set of preconditioned structures that are difficult to fully identify. Therefore there will undoubtedly be factors involved that are overseen or structural aspects present at the case site that are not present elsewhere and vice versa. To thoroughly analyse all such factors is outside the boundaries of this thesis.

4. Analytical setting

4.2 Theory

The theory chosen to help navigate and analyse the processes in Akureyri, and to answer the research questions, is transition theory as it contains tools that are useful in analysing societal transitions. The formation of transition theory came about once it became clear that the social fabric of societies had to be taken into account when explaining technological innovations and larger societal transitions (Geels, 2002). According to Rotman, Kemp and Van Asselt (2001) transitions are: "the result of developments in different domains" (p. 16). They further explain that the domains can be in various areas, from technology to culture, but are connected through multiple causalities and dynamic interactions. The empirical data gathered was analysed deductively from following frameworks.

4.2.1 Transition frameworks

The MLP framework

To visually analyse the dynamics of the transition I will be using the analytical transition framework of multilevel perspective (MLP). It was chosen due to its usefulness in exploring transition's underlying mechanisms, and pathways (Geels, 2005a). The use of this theory is to get the most out of the Akureyri case study as I can. MLP framework is applied in a descriptive context to explain dynamics between three identified levels: landscape, regime, and niche, and how that interplay enables system innovation to emerge (p. 684). The dynamic interaction of MLP levels is what determines the mechanism of transition. According to Geels (2011) various factors align and reinforce each other (p. 29) with complex causality. A commonly used application of MLP is to identify a specific socio-technical system in technological transition (TT), for example energy systems (Geels 2004; Elzen et al., 2004) or transport (Geels, 2002; Geels, 2012) or historical cases such as water systems innovations in the Netherlands (Geels, 2005b). This is not the case in this study due to the nature of Akureyri's transition and the defined system, further explained in chapter 5.1.1.

The MLP framework is traditionally applied to nation-level transitions (Geels, 2013, p. 14) and has been criticised for not explicitly defining the urban scale (Hodson and Marvin, 2013, p. 59). However Geels (2013) has attempted to define the role of cities in socio-technical transitions from the MLP in national scale transitions. He identifies individual cities as having one of three roles: as primary actors, as seedbeds for transitions, or as having a limited role (p. 17). The MLP framework has also been applied to the wider context of sustainability transitions with a focus on technological innovations (Elzen, Geels and Green, 2004).

The ULCT framework

In addition to MLP I draw from the conceptual framework for understanding urban low carbon transitions (ULCT) developed by Bulkeley, Broto, Hodson & Marvin (2013) introduced earlier in chapter 1.2. They created this framework, hereafter referred to as ULCT, as a tool to understand low carbon transitions within cities. This spatial scale of cities, and the focus on lowered emissions, is what makes this framework useful for analysing the various functioning parts of Akureyri's transition. Such as system innovation, governance, and project initiative interconnections. Various sub-theories within the family of transition theory are employed in the structure of the ULCT framework. Therefore I utilise those sub theories to the degree of their use in ULCT. Those are: 'strategic niche management' (SNM) which identifies niche development processes to have three core processes: visions, networks, and learning (Kemp, Schot & Hoogma, 1998; Schot and Geels, 2008), transition

management (TM) applied in prescriptive contexts as a policy tool for managing transitions (Loorbach & Rotmans, 2010), and urban living laboratories (ULLs) as places for: “sensing, testing and refining complex solutions in a real-life context” (Evans & Karvonen, 2013, p. 128).

4.2.2 Landscape, regime, and niche levels

As mentioned above MLP framework divides transition processes of socio-technical system innovation into three distinct levels; landscape, regime, and niche illustrated in figure 3. What each level entails is highly dependant on the identified system.

A landscape of a given system makes up external factors such as the social and cultural norms of society, political ideologies as well as deeply established structural trends (Geels, 2002, p. 1260). In this manner it represents the wider societal context, the technical and material setting that sustains society, in which regimes and niches are embedded (Geels, 2011). It can be various heterogeneous factors, from cultural patterns and normative values to macroeconomic factors such as oil prices (Geels, 2002) or demographical trends (Geels, 2011). Thus the landscape presents an external structure that changes incrementally.

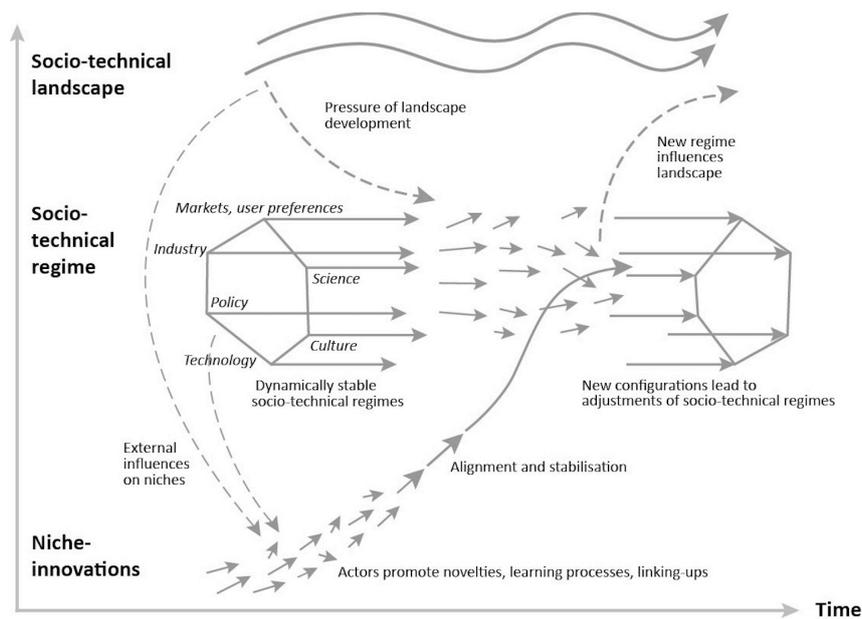


Figure 3. Dynamic multilevel perspective on innovation showing the alignment of ongoing processes of transitions (Adapted from Geels, 2011 as cited in Kaphengst & Velten, 2014)

The regime represents the governing bodies or organisational structures within the system. The scale for the regime is dependant on the socio-technical system itself; global, national or a regional system, determines the regime it is under (Geels, 2013). Can be a household, a local municipality or

an international organisation. Socio-technical systems can have be defined under a single or multiple regimes at different scales. Regimes are dynamically stable and changes happen slowly (Geels, 2002).

Niches are described as the safe places for innovation which otherwise struggle against existing regimes (Geels, 2005a). They are shielded from the economic processes and the existing regime to be able to generate radical innovation (Geels, 2002). Further the described objective of a niche is to break out into the mainstream and transform the regime.

5. Findings and Discussion

Following is the analysis and discussion of Akureyri transition with the help of chosen frameworks MLP and ULCT. This is done with the analytical structure of the overarching socio-technical systems of carbon flows and its dynamic interactions to Vistorka and CNAS. I situate Akureyri’s trends through the given frameworks, highlight drivers, and success factors. In other words analyse what has happened, why the transition has happened and how the transition has succeeded. Success in the sense that entities have not failed (been cancelled) but connected in the transition. Projects are seen as a success due to their resilience in staying active and involved in the CNAS regardless of how economically successful they are.

5.1 What is the Transition: Trends

Tables 1, 3, and 4 set up the basis for analysis and discussion in chapters 5.1. 5.2 and 5.3. The core of the three research questions divide the tables into trends, drivers, and causal success factors. These will be analysed in light of MLP framework and ULCT throughout.

Table 1. The categories gathered deductively from actors given views in terms of tends of the transition in Akureyri municipality

RQ 1	Column 1	Column 2
What has happened (Trends)	Precursors (groundwork)	Recycling system
		Free public transport
		Molta
		Lobbying by regime agents
		Methane station

	Socio-technical system	Carbon flows in Akureyri
	Niche Development	Orkey, Molta, GPO, Methane station
		Intermediary: Vistorka
		Strategic niche management
	No transition management	Policy came afterwards

Largely unconnected projects are depicted in timeline figure 1. Though these events were not intended to lower carbon emissions, they are seen as a start of the ULCT in Akureyri as precursors.

5.1.1 Identifying systems

Defining carbon neutrality and energy streams

Within CNAS the neutrality refers to the general understanding of net zero carbon footprint, or net neutral carbon emissions, but not total neutrality. Thus carbon is still released but is sequestered through countermeasures and other emissions are reduced, for example by using recycled carbon or ‘new energy fuels’². This is because reaching absolute neutrality, while still interlinked with the global market in its current form, is impossible. The boundary of this net carbon neutrality is the municipality's inner processes and therefore neutrality only refers residents’ direct emissions as shown in table 2. Likewise the authors of ULCT framework speak of reaching a low carbon economies (Evans & Karvonen, 2013; Smith, 2013) possibly because total neutrality is more challenging and requires global synchronicity while the framework focuses on individual cities.

As explained above Akureyri neutrality in CNAS refers to residents direct emission through the energy streams of inner processes. Table 2 shows that only two out of the four energy streams need to be tackled in terms of emissions since first two are virtually carbon free and thus not of concern. The last two are the carbon flows that Vistorka attempts to tackle in the pursuit of making Akureyri carbon neutral, in accordance to the CNAS. These processes exclude external factors such as import,

²Any fuel that does not derive its energy from fossilised carbon deposits, such as biogas, hydrogen, biodiesel, or other recycled carbon. Other clean new energy would be electricity harnessed from low carbon sources as is done in Iceland.

residential consumption, international transport etc. which represent indirect emissions, as they lie beyond the governance capacity of the municipality.

Table 2. Carbon flows of households inner functions, as four energy streams, responsible for resident's direct emissions, identified by involved actors

Energy Streams	Energy source	Emission type
1.Electricity	Hydro	Renewable, carbon free
2.District heating	Geothermal	Renewable ³ , virtually carbon free
3.Organic material (waste flow)	Biomass	CH ₄ (from anaerobic decomposition in landfill)
4.Transport	Fossil fuel	CO ₂ (product of combustion)

Socio-technical system of carbon flows

In this thesis I take a step back from the narrow frame of a single socio-technical system, as is the standard within MLP (explained in chapter 4.2.1), and instead define an overarching system of the carbon flows within Akureyri. These are the carbon flows only pertinent to the municipality's inner processes (see table 2). This wider system's view, of the municipality carbon flows as a whole, increases the generic aspect of the results as it illuminates drivers that are applicable for various systems within municipalities. According to Geels (2002) the landscape, regime, and niche levels of MLP are: "analytical and heuristic concepts [used] to understand complex dynamics of sociotechnical change" (p. 1259). This is why I see it applicable to view the wider system of the carbon flows as the socio-technical system of interest in this case study. Another justification for not having focused on one defined socio-technical system is the nature of the transition in Akureyri where the connections between and within the two main sub-systems, of waste management and transport, are critical to the transition as a whole as can be seen in figure 4 below.

³ Geothermal energy is considered renewable energy in Iceland though it is not inexhaustible. This is because it is harnessed under set sustainable limits of each borehole (Barðadóttir et al., 2003).

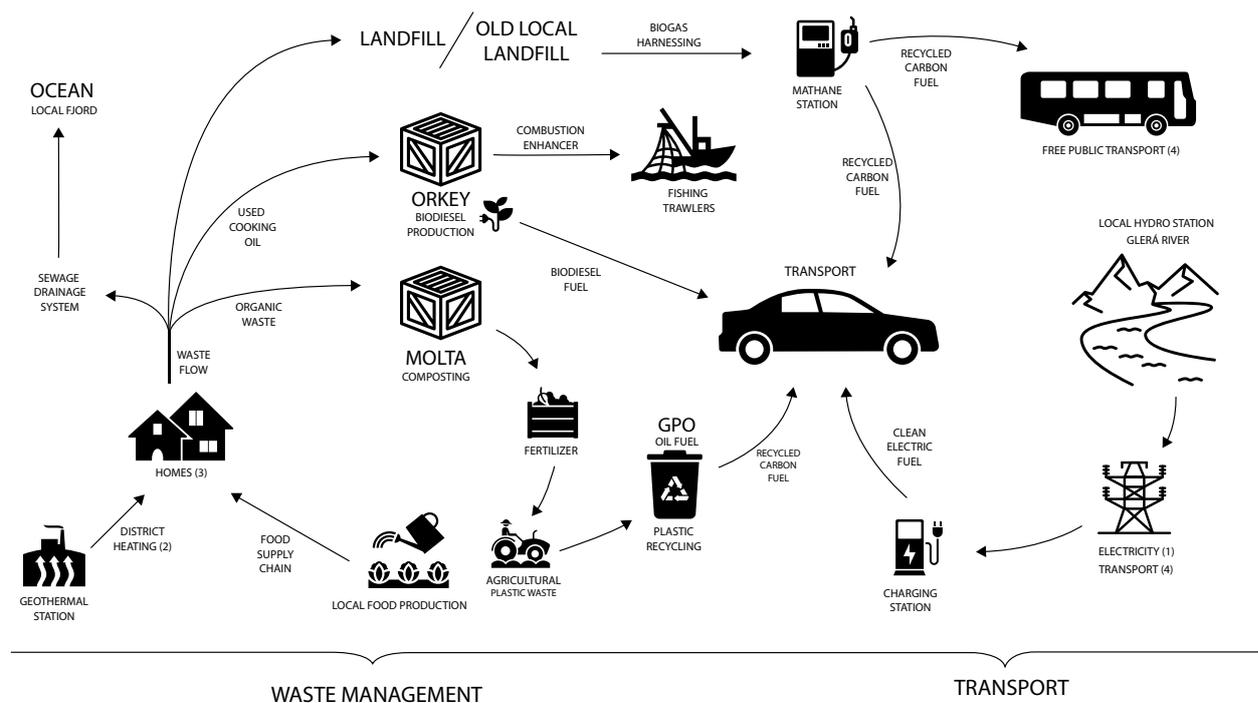


Figure 4. Simplified illustration of the socio-technical system of carbon flows in Akureyri. Showing the interlinkages between the two regimes waste management, transport through fuel production. The functions of all niche innovations is shown in context to the carbon flow system. The four energy streams are shown with given numbers from table 2 (Source: author’s intellectual property, illustration by Ragnar P. Kristjánsson)

Figure 4 shows carbon flows but I exclude carbon offsetting projects as I seen them as complimentary to emission reduction in neutralisation. These are projects such as the ambitious municipal forestry plans for the ‘green scarf’ surrounding Akureyri. The original reasons for those plans were not carbon sequestration but to create a wind shelter for the municipality as well as an attractive outside recreational area according to public officials. Forestry carbon offsetting projects have been criticised as they are often outsourced to other countries, to reach cheap land and labour, and thus become distant for the polluter (Carton & Anderson, 2017). However this is not the case for Akureyri as the green scarf is local and a section of the area will become the ‘flight forest’, a Vistorka project, where planted trees offset domestic flights. Additionally NO does carbon accounting and engages in its own forestry offsetting.

Evidently, the carbon flow system can not be transitioned in isolation but by alignment of reinforcing factors that create a circular flow (Geels, 2011, p. 29) affecting all relevant regimes. According to Geels (2011) this causes the transition to be driven by multitude of factors and causality is rarely simple. This too is very evident in this case study.

5.1.3 MLP levels in Akureyri

In the following section I will define each level of the MLP and how they translate to the specifics of the transition of carbon flows in Akureyri. This is illustrated in 5 below.

Landscape

As described in chapter 4, the landscape consists of external factors such as a historically rooted culture or economic growth paradigms. In Akureyri actors reported a strong culture of production which one CEO described to have settled some linear thinking in the community. Moreover actors reported general high environmental awareness in the public discourse, some thought due to a perceived connection to nature through the closeness of the surrounding fjord. They revealed a high residential demand for the town's cleanliness and beauty as residents take pride in that. A general political support for environmental policies has been since the turn of the century. Changes on this level are incremental but can influence the dominant regime by applying pressure. This landscape pressure is further described in chapter 5.3.2.

Regimes

Regimes in Akureyri are best defined through multi-regime interactions above. The dominant regimes are the municipal governing bodies and structures governing the processes within Akureyri relevant within the ULCT framework. These are the waste management regime, transport regimes and energy and utility regimes due to the relevance of NO as a regime agent. The ones defined within the urban structure are relevant to this thesis, though some are set on a national scale. Although this is a municipal scale transition study the regimes that function on a national governance scale are incorporated when relevant. These are mostly when regimes, national governance, push against the niche innovations emerging from Akureyri and present boundaries to their development.

Niches

A clear example of emerged innovative niches in Akureyri are the companies and projects under Vistorka's umbrella as they represent the local innovations that are protected spaces. Vistorka brings those innovation principles into the dominant regime and thus mainstreaming niche practices (Smith, 2007) as can be seen in figure 5. The protected space for niches derive from the financial and technical support, outward presentation as well as project design and strategic mergers.

The fuel production practices of Orkey, GPO and the Methane station all provide carbon neutral fuels through recycling, and Molta recycling of organic waste. A recognised benefit of recycling waste to

fuel is that they lowering cost and dependency issues of imported fossil fuels while still not involving an immense change of current infrastructure systems such as ETT requires (Pearson et al., 2012).

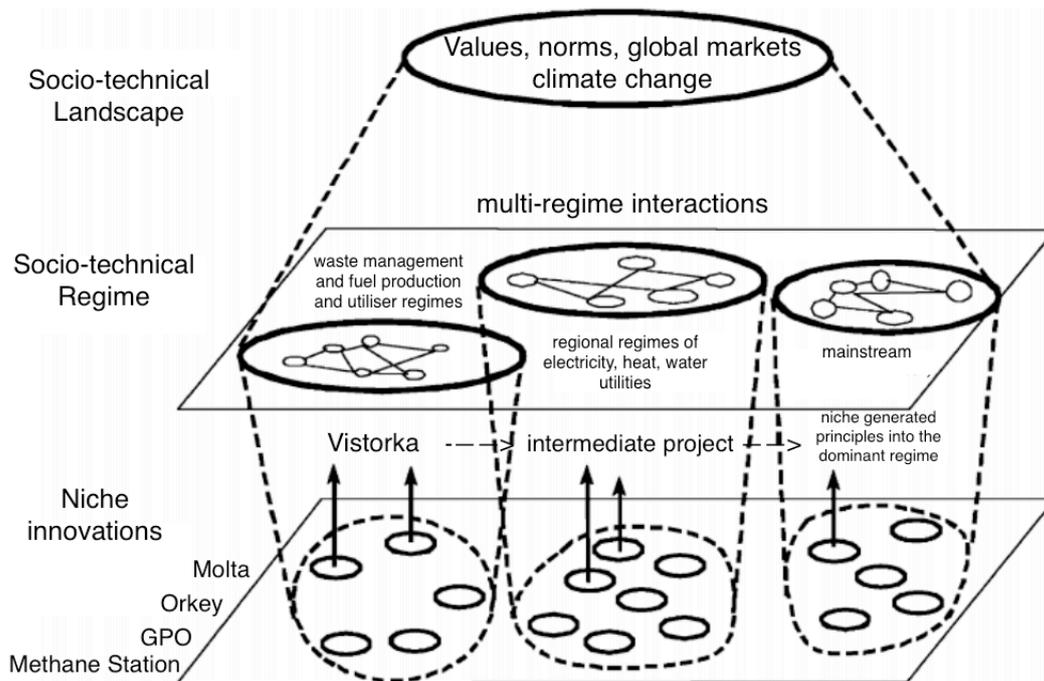


Figure 5. MLP framework as nested hierarchy in the case of Akureyri low carbon transition, showing niche innovations interaction to multiple regimes through Vistorka intermediary (Adapted from Geels, 2005a, p. 684)

The concept of a sustainable community, for a majority of actors was described as self-sufficiency. Many related it to be able to sufficiently provide with local resources, which enforces the ideals of local production. According to Hodson and Marvin (2013) constructing a more self-reliant urbanism is one of three critical ways to reshape cities to be more secure and resilient. Recirculation of waste is a big part of those strategic designs which withdraws reliance on international infrastructures. This is key in Akureyri's transition as all the niche projects deal with recycling waste of some sort as described above.

Multi regime-interactions and intermediaries

Creation of multi-regime interactions emerge in sustainability transitions (Raven, 2007; Konrad, Truffer & Voß, 2008). The MLP enables this visualization of multi-regime interactions rather than only niche innovations pressuring a single regime (Raven, 2007) and are crucial for the growth of certain niches (Geels, 2011). This is represented in Akureyri as the linking of waste management, transport, and fuel production. In that way the waste management transition is propelling emerging ETT to a degree by increasing supply of new fuel alternatives. NO by itself governs a few regional regimes of

electricity, district heating, drainage and water systems so that company's functions represents a multi-regime interactions. This extensive role of NO presents a lowered level of complexity in Akureyri whereas in many other Icelandic municipalities those utilities are split between service providers which complicates their system dynamics. This arguably aligns and eases decision making within those regimes.

Niche emergence is aided by Vistorka, as an intermediary, by connecting them to multiple regimes. The socio-technical systems of carbon flows in Akureyri is the result of three above mentioned regime interactions. These processes are then strengthened by Vistorka which is an asset because it aids niche innovations to expand. An example of this is how Guðmundur designing expansions possibilities for Orkey and Molta in 2016. Vistorka not only combines functions, as described in SNM (Smith 2007, Hodson and Marvin 2009), but is also operationally placed between the municipality, NO and the innovative niche innovation entities as seen in figure 6 for clarity. This intermediary position Vistorka is fulfilling can therefore be seen as a semi-government entities working at different scales with their prime feature of mediating functions between the various projects and regimes (Fischer & Newig, 2016).

5.1.4 Strategic niche management (SNM)

A common factor in Akureyri's transition is the top-down governance approach to niche development as is promoted within the SNM framework. This theory is a transition sub-theory, such as TM, which both navigate how transition can be managed and are used as policy tools. Support comes from private and public entities which rather relates to a top-down approaches. In other words that regimes are directly involved in niche innovations instead of pushing against them. While the MLP framework mainly has been criticised for focusing too much on niches emerging from 'bottom up approaches' (Geels, 2011) SNM approach promotes 'top-down' interventions to create or manage niches e.g. through government grants (Bulkeley, Broto, Maassen, 2013). Such entities are essential to coordinate capacity and mobilise effectiveness according to Hodson and Marvin (2013). Furthermore they are needed to create a space outside the inherent inflexibilities of both existing municipal governance networks and existing socio technical regimes (Hodson, 2008) to achieve the priorities of Vistorka's vision. Moreover according to Bulkeley (2013a) transformation can be "incremental or radical based on the degree of alignment between innovation at the niche level, with windows of opportunity created within the regime" (p.4). Vistorka very clearly provides alignment of innovations with opportunities in Akureyri.

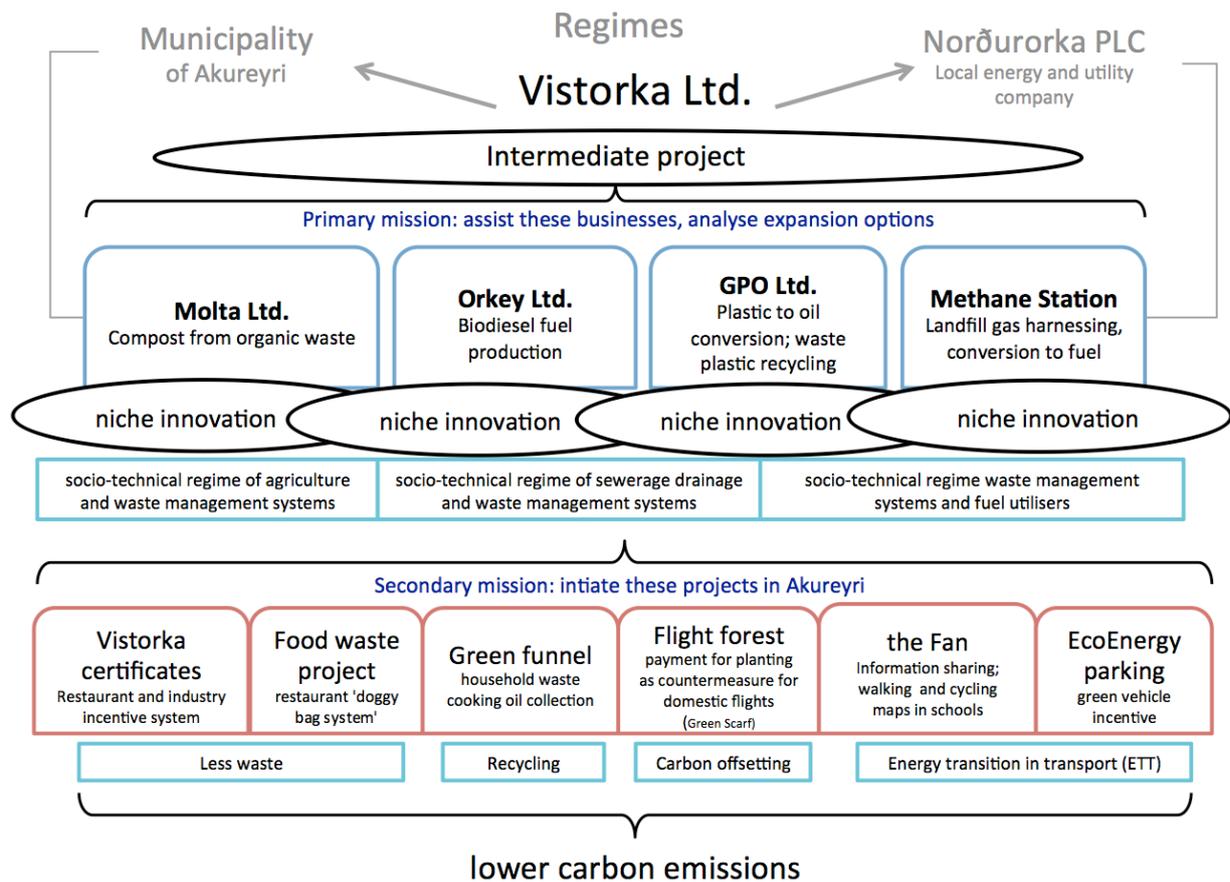


Figure 6. Vistorka's current functions in fulfilling its role in Akureyri's transition as an intermediary entity supporting niche innovations and propelling projects

Problem solving niche adopted by regime

It has been reported that niche innovations can be adopted within regimes to solve certain problems (Raven, 2006 as cited in Schot & Geels, 2008). It is clear that the function of Molta and Orkey as Sigurður mentions those companies not only provide employment and produce a product of value but they simultaneously solve a waste disposal problem. Molta handles organic waste for the municipality (due to it being legislatively banned from landfills) and local food production firms (Norðlenska). Similarly Orkey reduces the amount of oil that clogs up drainage systems which, a responsibility of NO's and thus in their best interest to support. These problem solving factors were important to attain the support from the Akureyri and NO, according to Orkey board members as well as actors that lobbied for Molta. It can therefore be seen as the regime adopting Vistorka's project as problem solving niches.

Policy came afterwards

The current ULCT underway in Akureyri was not intentional until the creation of Vistorka and formulation of CNAS. Within the framework of TM, a well structured city transition entails an outlined transition management cycle (Loorbach & Rotmans, 2010) or an outline by a committee stating steps and objectives enforced by policy. However this is not the case in Akureyri since the intention for CNAS was not laid out before the projects were developed and implemented. As Guðmundur explains: “This is a typical example of the strategy being made afterwards. Partly it's a coincidence that companies with these projects were here. Then people realised this and the strategy [CNAS] was formed”.

The reason for precursor projects (see timeline figure 1) were varying, from: meeting new legislation or regulations, lowering municipal expenditure, increasing efficiency, lowering traffic etc. A good example of this was incentive to reduce overall household waste, by recycling, due to the high cost of transporting waste to a new landfill site after the local one closed down according to Molta's CEO. She continues: “It doesn't feel like one decision but more of a development that lead to this happening”. Today however, after the formation of CNAS, the role of Molta is held in high regards in terms of its reduction of carbon emission and has been called the town's ‘environmental hero’ by Vistorka's CEO.

The fact that environmental concerns or climate change are not main drivers of this transition early on but rather closer more tangible factors. Although many actors identified climate issues as being an important environmental problem particularly at a national level. This is a recognised phenomenon as researchers have concluded that climate change by itself is often not a sufficient motivation for transitions (Geels, 2013) and that municipalities should rather focus on the tangible advantages when promoting initiatives (Busch & McCormick 2014). This has not gone unnoticed by the actors in Akureyri with the most experience in lobbying for this transition, mainly Guðmundur and Sigurður. They emphasised presenting initiatives as economically and practically beneficial projects rather than solutions to existential climate crises.

However now with Vistorka and CNAS the focus and connections between projects is explicit, and the idea of lowering carbon emissions is gaining traction. Before that the reduced atmospheric carbon was at best a minor consideration according to public officials. Even though a wider environmental concern by decision makers was present and may have laid the ground ripe for Vistorka's creation further explained in chapter 5.3.2.

5.2 Why is a Transition Taking Place: Drivers

Perceived causal mechanisms of transition in Akureyri by actors, discussed in this chapter can be seen in Table 3. Simple coincidence is also considered to have had a role.

Table 3. The categories gathered deductively from actors given views in terms of driving forces of the transition in Akureyri municipality

RQ 2	Column 1	Column 2
Why has it happened (Drivers)	Agency	Individual agents
		Transition champions
	Prospect of branding	Attract people
		Attract tourists

5.2.1 Agency

The role of agents in the MLP has been contested as some criticise a lack of agency (Genus & Coles, 2008) while Geels (2011) defends the space for agency within the framework by explaining that “the different structural levels are continuously reproduced and enacted by actors in concrete activities” (p. 29). Furthermore importance of actors in transitions has been analysed by Fischer & Newig (2016) who determine their importance lie in their ability to fulfil various roles at various times in transition.

NO can be seen as a regime agent that holds some dispositional power over what strategies are pursued and can therefore influence transitions. Akureyri municipality’s almost total ownership of the local energy and utility company, NO, is a great resource that can not be ignored. It is identified as such by some actors but not emphasised as I expected. Such local hegemony should not be taken for granted since energy and/or utilities can be either state run, through a regional partnership with shared holding, or privatised. The fact that the municipality has authority over their distributor gives them more freedom to pursue certain strategies that require resources as was found with municipalities transitioning to renewable energy (Busch & McCormick, 2014). This way NO can function as a regime agent and their actions would include their own carbon accounting, carbon offsetting through local forestry and taking on the Methane station project.

As mentioned above the CNA strategy was made after many various, largely unconnected, companies were linked together under the concept of Vistorka. Yet that does not explain why these companies, which processes lower overall carbon emissions, were established in Akureyri in the first place. Even more importantly, why the companies have succeeded and been connected to a municipal strategy with a varying degree of public-private partnerships in their shareholding structure. Although they found it difficult to say, actors identified the main reasons for them being located in the municipality due to coincidence, atmosphere of entrepreneurial positivity, individuals' resourcefulness, or all three. As one town councillor summed it up: "Right people in the right place".

Transition champions

As with other reported city level transition studies here the focus is on local specificities as well as visionary individuals (Geels, 2013). Those are identified as transition champions and are reported to have great influence in Akureyri. A former chairman of Akureyri's environmental committee (hence EC), stated that environmental issues are generally not held in high regards and they tend to be forgotten in politics. In his experience other issues are prioritised because they are more financially important for the municipality. That is why in his view: "By definition the environmental issues always need to have some advocates or champions, because they don't get prioritised by themselves". This need for advocates to push environmental agenda is met in Akureyri as many actors attribute the transition in Akureyri as being driven by the ambition of Guðmundur and Sigurður. Actors describe them as having 'burning interest' and 'deep passion' for working on environmental matters in addition to being experts in terms of emission reduction and general environmental matters. Moreover they are the creators of Vistorka, as a concept as explained in chapter 2.2. As NO CEO explains, having powerful spokespeople for this strategy is what sets Akureyri apart, further disclosing that Guðmundur's position was specifically tailored around him as he showed such enthusiasm and energy in selling the idea of Vistorka.

Regime actors

Guðmundur and Sigurður seem to have both fulfilled the roles of innovative regime actors as participants in the transition arena (Loorbach & Rotmans, 2010). They are said to possess many of the important 'process capabilities' and 'substance capabilities' identified by Loorbach & Rotmans (2010, p. 140). Having a vision is an important strategic skill within transition management which they have according to Sigurður: "This vision is ours [...] we both have this ideology and we are [now] in a position to work on these ideas". The managing director of GN (waste management service provider, hence GN) agrees with this when he explains how he sees their role as looking at the big picture and see the system holistically.

As explained in chapter 4 visions are core process within SNM. They provide direction and focus towards a certain goal (Kemp, Schot & Hoogma, 1998). As presented by actors the CNAS has a long term vision. They believe that with the CNAS robustly formed, under the guidance of Vistorka, the vision can be more efficiently strived for with a more focused support from Akureyri governance regime. A specific goal date has not been set as the time to have reached carbon neutrality, however specific targets are defined in the municipal ETP outlining CNAS (Akureyri municipality, 216). These are goals for fuel use of public buses and the municipality's vehicle fleet, ETT infrastructure, obtain the 'bicycle friendly community' certification and refining the waste recycling system to name a few.

Actors Idealism for green niche creation is recognised as an asset and is prevelant in the socio-technical innovation of Orkey. Those niche actors, creators and board members of Orkey, share an idealism on the companys value. One member described it as a 'beutiful concept' that the creators did not want to give up on though business environment are challenging. They report a unity in the board which can be related to how "idealism helps launch and bind niche networks together" (Smith, 2007, p. 447).

Lobbying for the concept

Both of them identified their role in the transition as pivotal especially early on when they actively lobbied together for Victoria's creation. As Guðmundur explains: "we went and had meetings with everyone, NO, the board of NO, municipal council members, all the political party leaders, local investment firm representatives and more etc.". It's from this lobbying that most actors recognised their passion for this vision. One town councillor disclosed that she, and her colleagues in governance, had been informed on Akureyri's situation by Guðmundur and Sigurður before the creation of Vistorka that created an awareness in them as decision makers. Clearly indicates that the transition champions' lobbying had an impact. Additionally they have both been diligent in writing articles in local and national publications related to CNAS and calling for national government engagement to further incentivise low carbon activities through legislation, carbon tax or state subsidies. There they performed communication and consensus building, both on a local and national scale, which is another crucial skill for change agents in transitions (Loorbach, 2007).

Competencies in the transition arena

The working relationship between Guðmundur and Sigurður is close and they display many key substance and process capabilities needed for actors in the transition arena. There are specific established competencies needed for successful transitions according to the transition management framework. Their close working relationship is widely mentioned by actors. Their professional

relationship is interesting due to how often actors don't distinguish between their respective companies, but refer to Vistorka representatives in plural. Sigurður is not an employee of Vistorka. He however, collaborates closely with Guðmundur and Vistorka's ventures as it connects to the aim of his own company, Orkusetur. It's primary aim is to increase energy efficiency and exploring new energy sources, as well as to create public information material. It functions as a point of contact between government, the public, businesses, and institutions (Orkusetur, 2017). Although Orkusetur's role is not place specific, as it works on a nation wide basis, working along with Vistorka's projects is within the given function of the company to lower use of fossil fuels and aid clean energy transition. As Sigurður explains: "if lowering carbon emission is an incentive to get that transition through then I can just as well do that. [...] But also, the opportunity is here, the projects are here". The opportunities in Akureyri were identified by these two key actors and a concept build around them.

This close working collaboration is well defined in terms of roles by Guðmundur: "Sigurður is the one that creates the ideas and my job is to implement solutions. He is the academic idea building side and I am the technical implementing side". Together they possess additional key tactical competencies such as ambition, leadership, and thinking in terms of co-productions as well as problem structuring skills, abstract- and systems-thinking, specific knowledge and analytic ability (Loorbach, 2007, p. 140).

As transition champions Guðmundur and Sigurður have served many functions. Between the two of them they have lobbied, worked on concept building, project development and design as well as outward presentation of CNAS. Transition actor roles are known to be erratic and can change over time having varying influence on transitions (agency) according to Fischer & Newig (2016). This is reflected in how Sigurður sees his aim at Orkusetur to function like an enzyme to facilitate project creation: "get two entities together and make something happen... then step out of projects once they are functional".

5.2.2 Prospect of green branding

In terms of drivers and what Akureyri gained with this transition actors widely mentioned the opportunity of branding, the increased reputation and 'green image' of the town, mainly for two desired reasons. These were to attract residents and to attract increased numbers of tourists.

Positive effects from green discourse have been shown to enforce transitions in cities (Späth & Rohracher, 2013).

Attracting residents and tourists

This idea of a city having a role in attracting residents is explained by David Harvey (2002) in his theory called 'from managerialism to entrepreneurialism'. It explains the shift in city's role from a managing nature, such as infrastructure maintenance and general management practices, to primarily alluring and attracting businesses and residents for economic purposes. This desire is directly reflected in some actors descriptions of drivers to create CNAS. As Guðmundur explains: "Then there was an interest to make Akureyri competitive somehow. We need carrier people. One of my ambitions to attract well educated young people to live here". According to him this was an easy ideology to sell to decision makers as they agreed on the benefits of this early on. Attracting people who find the 'green' label of Akureyri attractive as well as well educated young people that would take part in building up a sector specialising in value production from waste products. To create this concept of Akureyri as the hub of knowledge in terms of biorefinery practices to attract driven carrier people to Akureyri.

After the financial crash, transition champions, thought of presenting Vistorka as a way to: "create an image for Akureyri, create something new and label ourselves somehow" according to Guðmundur. The appeal of this was reflected by the actors as being one of the main benefits the municipality would achieve with CNAS, and this prospects was not lost on municipality decision makers either according to Molta's CEO. She explains that the municipality is now reaping the reward of having saved Molta, now that it has 'green image' potential. Though it must be stated that when public officials and politicians were asked specifically about the prospects of active green branding, outside of Iceland through information sharing in English, most described Akureyri's transition too recent to justify a green branding campaign, though the future prospects of this were seen as positive.

Thus there is a concurrence among actors of the reinforcing effect of attracting talented skilled people working on environmentally positive projects that then continuously enforces a 'green image' as can be seen in figure 7. This is seen as positive in social and economic terms for the municipality as it creates growth and activity in the area, both from new residents as well as increased tourism.

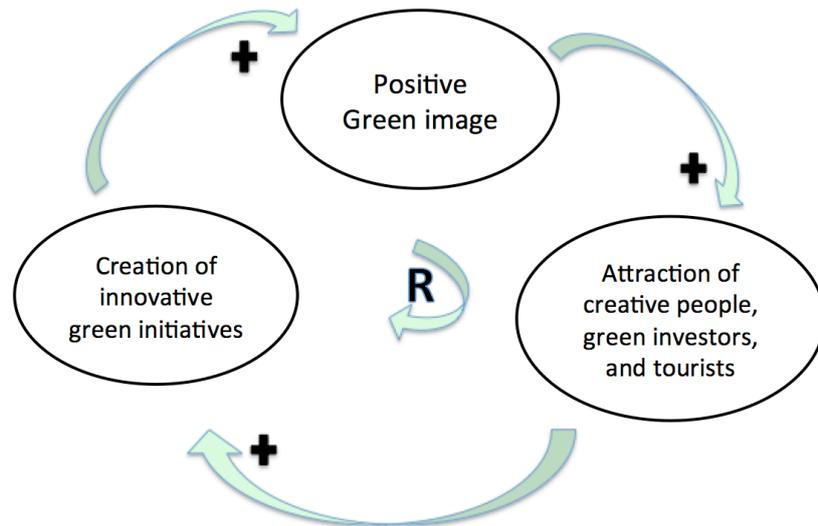


Figure 7. A causal loop diagram (CLD) depicting the reinforcing loop of a positive green image and attraction of desirable residents or tourists (Source: author’s intellectual property)

The governance regime sees direct societal and environmental benefits to CNAS as well as indirect economic benefits and thus is inclined to support niche innovation and mainstream the principles of low carbon transition. The actors who represent decision and policy makers identified societal benefits such as happier population. The indirect economic benefits were seen to be mainly through reputation and branding opportunities as well as circulating medium savings due to less import and more local production. These factors had the regime showing niche innovations support by providing the capital stock when needed for survival as well as support for Vistorka’s creation.

Historic examples of municipalities gaining momentum in urban environmental transitions as such as Graz in Austria which was labeled ‘eco-city’ for its renewable energy programs (Späth & Rohrer, 2013). However this momentum has slowed down significantly in recent years after key entrepreneurs left, leading to the image shifting away from eco-friendliness. The pivotal role of key people is identified as the primary success factor of Graz eco-city’s transition, as a few entrepreneurial players, along with a self-enforcing green image (p. 98). This resembles Akureyri’s transition in terms of these two drivers and therefore presents a good lesson for Akureyri to learn from, to keep up transition momentum.

5.3 How has Transition succeeded: Success factors

Perceived causal success factors of the transition in Akureyri by actors were connections in the community and steady political regime support as can be seen in table 4.

Table 4. The categories gathered deductively from actors given views in terms of success factors in the transition in Akureyri municipality

RQ 3	Column 1	Column 2
How has it happened (Success factors)	Connections	Size
		Cohesion
		PPP
	Landscape pressure: Political support	Depoliticised issue
		Top-down approaches
	Akureyri's role	Primary actor and a seedbed

5.3.1 Connections

Understanding cities’ low carbon futures is dependant on the relationship with their socio-technical networks that sustain them (Hodson et al., 2013). Actors mentioned connections through shareholding, example is Tækifæri (Opportunity) a local investment firm which holds shares in three of the four businesses under Vistorka: Orkey, GPO, and Molta. It specialises in regional investments in innovation and businesses and this creates a direct connected between socio-technical innovations in the region. Immense community connection and cohesion awareness is what ultimately made Akureyri municipality support Molta operationally after the financial crisis according to Guðmundur. Then public share increased as a last resort so to keep these companies functioning when capital stock was lacking, same as NO did in the case of Orkey. Throughout this research, various approached actors had a direct operational connection to other entities in this transition (see table 6 in appendix B).

Goldilocks size

Within smaller community units, individuals can arguably have a considerable affects in transitions. As one high level managing director explains: “the smaller the unit the easier it becomes to sell the idea and drive forward the implementation”. The chairman at the Vistorka council of specialists saw the optimal size of the municipality beneficial, saying: “Akureyri is big enough to have all the infrastructure [all levels of managerial complexity] yet it is small enough to utilize the proximity and

the connection between people, tighter holdings and shorter communication channels". Indeed this proximity of actors is the reason why transition researchers have pointed to cities as being more suitable for low carbon transitions rather than national scales (Hodson, Marvin, Bulkeley & Broto, 2013). Actors identified the success lying in the close connections in the community and strong connection between residents. Networking and lobbying is easier and communication channels are short. The actors did not seem to take these connections for granted. Previously in chapter 5.2.1 the close working relationship between Guðmundur and Sigurður was explained but the reason for it, according to Guðmundur, is largely due to small unit size of companies. This encourages collaboration between those CEOs and fosters interconnectedness in their work.

Private Public Partnerships (PPP)

What is clear about the largest projects in this transition, mainly by Orkey, Molta, and even GPO, is strong private public partnerships (PPPs). These partnerships are traditionally defined as: "cooperation of some sort of durability between public and private actors in which they jointly develop products and services and share risks, costs, and resources which are connected with these products" (Van Ham and Koppenjan, 2001, p. 598). The companies under Vistorka's wing are all either directly or indirectly connected to Akureyri in their shareholder makeup albeit to a varying degree. This is specifically mentioned by Guðmundur as an unique aspect of these projects in Akureyri. The general perception of this structure is positive as they find it's influence on the good with one private company's CEO explaining that it gave the businesses more legitimacy to be connected to these public entities and as the rector at the University of Akureyri (hence UNAK) described: "The units are always more powerful together than in isolations. Working together in a cluster, with various knowledge, but towards the same goal".

That is not to say that all aspects are positive. Negative aspects of the PPPs manifested in 'silent funding' by large financially powerful corporate investors in the case of Orkey. Those actors that spoke of this felt such shareholders, not willing to use their influence and bring in much needed additional equity, were a hindrance rather than an asset. Additionally one municipal council representative found the complexity in Orkey's shares increase the difficulty for the municipality to back the company.

5.3.2 Political support as landscape pressure

When asking what has made Akureyri take these steps, in their environmental policy CNAS and Vistorka, it is clear that politics played a big role. Actors widely agreed on the importance of political support for this transition CNAS. In general the positivity from local government was valuable.

However when actors perceive this support coming about varies. Some actors saw the politics shift in favour of the support only once Vistorka was created in May of 2015. A CEO of a company under Vistorka's umbrella explains that once Vistorka was given resources to start working on these projects he recognised a great change: "Vistorka is making these things go in the right direction. Now that Guðmundur is working on this he gets the politicians to think". This is echoed by various actors implying they feel this current municipal governance has had a stronger vision than previous ones, and was also explicitly mentioned by Guðmundur. As a company CEO put it: "Akureyri has been lucky with its political majority, that had this vision, and that they decided to put this in the forefront". Guðmundur relates this to coincidence, rather than a cohesive plan, because administrative agents care about these issues and some projects were in place. This messiness of urban transitions is tangible in urban transition studies (Hodson et al., 2013) and that transitions can be "wrought by the unintentional co-occurrence of multiplicity of actions"(p. 201). Guðmundur further sees the Akureyri's mayor as having been diligent in publically championing Vistorka. This governing regime support establishes Vistorka's position and gives legitimacy to their projects. Political interest and emphasis causes more funding being put into these issues with a long time public official saying: "I don't believe 10 years ago we would have invested in a methane bus that costs 10 million ISK".

The question remains why have the politics in Akureyri become so supportive of environmental projects? Many actors relate that to an increased general environmental awareness in society. This describes a landscape pressure put on the regime which provides the context for regime change to integrate low carbon practices. The increased environmental awareness following the organic recycling system, emphasised by actors, might have propelled this landscape pressure in Akureyri more so than in other places. The perceived shift in residents environmental attitudes has settled in the cultural and has created a certain positive atmosphere centred around environmental action.

A firm municipal statement, in the form of CNAS, has made it easier for companies and institutions to implement their own. Molta CEO discloses this as being the case for Molta's own environmental strategy, making it easier to follow along and commit to. In that way the municipal strategy gave some stable foundation. UNAS's rector further states that the official municipal strategy had great influence in the University's own policies. According to him UNAK's role is to be a part of this community and follow the local guidelines laid out. He describes an environmentally friendly atmosphere having risen within the school since this direction was taken by the municipality and thus UNAK joined and took on this ideology. Further stating that he sees the role of the municipality to create this atmosphere for institutions and businesses to follow as well as residents. Thus the

landscape pressure has helped open the windows of opportunity for niche practices to be mainstreamed in the municipal regime. This further reinforces a cultural change at the landscape scale.

Good ground for good ideas

Good ideas often get support from the community and from the political sphere. Actors reported saying the municipal council has shown great will in supporting environmental projects. The chairman of the board of Molta felt that the voices of the companies and individuals were heard by the local government who took them on with positivity. The municipality seems to see an economic opportunity in environmentally friendly projects so they give support to idealistic people with ideas according to actors which is potentially an important factor in their support for them. Molta's CEO explained that the municipality is positive towards projects, to create value and revenue which is beneficial for the society, but especially those with some environmental benefit. Support is also perceived to come from local businesses and the community as a whole according to the chairman on the board of Molta. It connects back to people's desire to pursue business ideas, niche innovation, that they believe have a positive environmental impact and success comes from the support from governing structures and the community which then reinforces this flow.

Institutional embedding of low carbon strategy

Vistorka is, in some actors' minds a positive authority on environmental matters that municipal politics and governance structures listen to and co-operate with. In that way the environmental issues have been de-politicised, now that Vistorka will work with future municipal councils. Most actors concur that general good political will towards environmental projects has been stable. This is backed up by a civil servant, explaining that even though there might be some minor changes made between terms, the overall direction is the same, and CNAS is therefore expected to continue as the backbone to the municipalities long term environmental plan.

Even though strong political support for the environmental matters is widely reported on by actors the official managerial procedures of governance do not reflect that emphasis according to two former chairmen of the municipality's EC. They both perceived low value given to the EC with fewer meetings and being described as a "cute little committee". According to their experience the EC chairman position is not generally sought after and thus might be valued less or its importance considered little by the general governance culture. It would be that the politics in Akreyri have outsourced the environmental policy focus to Vistorka rather than embedding it in its own internal governance structure.

However Sigurður sees this as one of the undervalued benefit of Vistorka as it solves another, less detectable, problem for politicians. That is relieving politicians from having to comprehend the complex environmental problems and come up with solutions. That pressure, he thinks, might act as a barrier to concrete action. With Vistorka the politicians, public officials and NO representatives can direct those all projects to be holistically analysed and solved by Vistorka and can outwardly affirm that these issues are being tackled in good faith. This is indirectly backed up by the municipal councillors that express trust in Guðmundur and his work at Vistorka, and referring to him as the specialist in these issues.

This shows that embedding environmental matters into all functions is important, as the mayor of Akureyri stated that mainstreaming environmental low carbon principles into governance structure is an aim for the future, and Vistorka assists by keeping that focus for the municipality. Therefore it's practices are institutionally embedded in Akureyri's structure which is a key criteria in SNM (Smith, 2007).

Top-down approaches

Both Guðmundur and Sigurður emphasise the importance of top-down approaches implemented by governing bodies. This is largely due to the success of the recycling system implemented in 2011 even though a lot of people were unhappy at the time according to former council member. Even some actors, involved in CNAS today, remembered calling recycling 'insane' and 'a nuisance' at the time but don't perceive it as problematic today. This see can be seen as a certain mentality shift created after the recycling was implemented. As Sigurður explains: "a lot of progress was made well before the awareness was raised". With many other actors emphasising how recycling, even against their will at first, had an impact on how they behaved and how they felt about consumption supports the fact that awareness for them was raised after they were forced to recycle. Guðmundur has affirmed to politicians that environmental action is no longer a question of technical issues but an implementation issue, emphasising that it is up to the decision makers to implement policies that aid larger structural changes. This rhetoric of waiting for residential approval before implementing policies was commonly found amongst interviewed politicians when they spoke of being careful not to act against residents will and how important it is to have a support from the community. Sigurður however points at the recycling system experience as an example to learn from and not wait for awareness to be raised before implementations, but to be bold and make these changes. Being bold is relevant as 'guts' are defined as an important strategic skill in transition management as a mode of governance (Loorbach, 2007). Other examples of bold top-down decision making, relevant for CNAS,

was the municipal council to make the public transport free and NO deciding to create the Methane station in 2014, before there was a sufficient market for it both at the risk of losing money.

Although the initial opposition to recycling might have been a loud minority according to a survey performed in 2004, researching residents willingness to start recycling, with positive results as disclosed by the public official responsible for it at the time.

The creation of Vistorka however would, according to actors, not have become a reality without identified transition champions and their interest in creating the concept in close collaboration. The determined lobbying and promotional work for the concepts was key and thus can be seen initially as those individuals convincing a top-down creation of an intermediary entity supported by the municipality and private businesses. Perhaps that the emphasis and importance of environmental issues has not yet been fitted in the governance structure itself or the responsibility of that has been moved away from political committees and solely to Vistorka. This is still unclear in the structure of Akureyri's transition as it is still rather new. It arguably indicates that the success has to come from outside, from transition champions lobbying and pushing politicians, convincing them to act, as has been done in Akureyri primarily by identified transition champions.

An additional point made by Sigurður is that fossil fuel emission related initiatives need to be implemented through top-down management approaches since the direct effects are hardly felt by people such as the residents of Akureyri. That lack of impact disincentives action from grassroots and thus must come from above.

Despite the success of these centrally led implementation in Akureyri, top-down approaches have been denounced for a lack of success in energising the public and gaining their support (Barr, 2008 as cited in Smith, 2013, p. 159). This might come down to the cohesiveness in Akureyri as a community, largely due to its size, so people feel connected to decision makers which eases public support engagement. Be that as it may actors revealed that Akureyri's recycling system implementation approach was successful due to the detailed implementation presentation in the beginning of recycling and good communication with residents resulting in high participation. This was done in a collaborative approach between municipality and the waste management service GN and was deemed successful by its management director. Furthermore great emphasis was put on environmental education in local primary and secondary schools by enthusiastic teachers. This was decided after researchers in UNAK were approached to investigate the best most efficient way of

gaining public participation in recycling according to a managing director involved in Molta's creation. That research showed that getting homes to engage with the implementation was best done through the children. This was mentioned by few actors who mentioned how their kids knew how to recycle and energised their parents to engage as well.

5.3.3 Akureyri's role: a primary actor and a seedbed

In analysing the role of Akureyri in a national scale transition it depends on the defined system whether the municipality is a primary actor or provides a seedbed for transition within the ULCT framework (Geels, 2013). He identified city roles refers to national transitions so when reflecting on Akureyri's role it must be viewed through the national lens. Systems governed by national regimes tend to be nation wide systems while the city or regional governed systems are on a smaller local scale. The waste management system, for example, is a very locally based system governed by the Akureyri municipal regime. In the transition to recycling, Akureyri functioned as a primary actor due to its tight connections and holistic implementation of CNAS.

If however the system of carbon flow's is looked at, as overarching combined sub-systems, Akureyri functions more like a seedbed for transition innovation. That is because the municipality has provided the space for initial niches creation pushed through by entrepreneurial experiments (p. 22) such as Orkey and Methane station business model of recycling waste to create fuel. This role implies that this transition starts in cities but then gathers pace to involve larger scale actors. This is supported by actors who expressed a wish for a recycling transition to occur in other places. Some entities are based, nation wide such as GN, or work on a national basis under the state, such as Orkusetur so their vested interest are for a larger transition. Historically for these sorts of transitions, starting in 'city seedbeds', diffusion of innovative systems can be rapid (Hilton 1969 as cited in Geels, 2013, p. 23) which gives hope for a transition on a larger scale in Iceland. However all transitions are very system dependant in terms of speed of mainstreaming niche principles into a regime.

5.4 Critical viewpoint

In critical terms, the discourse within Akureyri's transition is not fundamentally questioning the current economic system. Many of the solutions are within the paradigm of 'market environmentalism' (Lohmann 2001, 2008 as cited in While, 2013; Menon & Menon, 1997). That is continued production and economic growth by marketing a municipal green image. Though some actors, such as Guðmundur, identify the biggest environmental problem being this mentality. People's perception

of their lifestyles, in terms of consumption, travel and energy use, as being how it has always been and validity its continuation.

Moreover the concept of carbon offsetting and neutralisation perpetuates the idea that societies can emit more, and mitigate climate change through technological fixes. In other words carbon offsetting projects disincentives emission reduction. Though some actors in Akureyri did mention lowering emissions, as one of two ways of achieving carbon neutralisation, the most prevalent was the mention of countermeasures such as forestry. Though as touched on earlier these offsetting is done locally which creates a necessary connection for the emitter to the offsetting efforts.

What remains problematic in terms of the discourse of carbon neutrality is how to you calculate such emissions? I have previously explained the focus on inner functions but even calculating those can be problematic.

In relation to discourses of weak vs. strong sustainability the situation in Akureyri is contradictory. The ULCT projects and businesses there show a clear example of strong sustainability principles, recycling and lowering pollution, but the motivations and gains most widely presented by actors related to economic benefits of the transition. These are values rather found within weak sustainability discourses where human capital can substitute environmental capital.

Nonetheless the objective of this paper is to understand the forces behind Akureyri's transition and to from it, identifying the positive factors that propel it, in a solution oriented approach, instead of fixating on drawbacks. This is in the interest of encouraging concrete action in terms of implementation rather than perpetual problem conceptualisation and inaction.

6. Conclusion

In this thesis I have analysed the dynamics of factors driving the transition of Akureyri and it's overall successful positioning as environmental frontrunner in Iceland. I started out by asking three core questions about the development of the low carbon transition in Akureyri that can be simplified down to; what is happening, why is it happening and how has it happened. I now return to those questions in conclusion of this research with some take-home messages as well as suggesting future research.

As with other transitions researches findings show that the transition in Akureyri is built on multiple factors still there are valuable lessons to be found. In answering RQ 1: *What are the past and current developments and dynamics in Akureyri's low carbon transition?* I conclude that Akureyri has managed to create this link between waste management and transport systems in its efforts to carbon neutralise its energy flows (figure 4). This linking of carbon flows helps connect the various entities and unify their efforts. This however was not initially intended and had much to do with coincidence of precursory projects on which the strategy was formed such as closing of landfill, creation of Molta, free public transport and the recycling system. Therefore the possibility of a strategy relies on dynamic interactions that create factors of success and had persistent drivers.

This connects nicely to RQ 2: *What are the motivations that have driven the implementation of this low carbon transition in Akureyri?* The drivers identified are mainly individual agency, especially from transition champions, as well as the economic prospects of an environmentally friendly image. Although many supporting factors assist a transition a clear vision, as well as ambition and agency of individuals, was the most influential driver in Akureyri's transition.

The success of the formed neutralisation strategy however could not have emerged were it not for a few key success factors. That leads us to RQ 3: *How have local governance structures and resources been used to facilitate the low carbon transition in Akureyri?* The success factors aided the stability of the current transition are good connections and the political regime supporting niche innovations. The cohesion in a small, well connected community also plays a role as it might alleviate the distrust in governance and thus result in a success of top-down approaches. The actors shared pride in their town and public officials understood that it was the municipality's role to lead this transition and make implementations easy for residents. Such careful approaches coupled with good information sharing has resulted in a perceived acceptance of the transition implementation and a good residential participation.

Returning back to the overarching RQ: *What determines a municipality's ability to actively advance low carbon transition?* I conclude, along with above mentioned results, that climate change does not suffice as a driver of such a transition, rather more tangible factors are needed to influence decision makers such as economic benefits. The strategy emerged when multiple presented projects were given a shared vision, under the guidance of Vistorka's enthusiastic transition champions, with steady regime support from local politics.

Despite all of Akureyri's efforts, it is clearly stated by municipal councilors, that Akureyri has not invented the wheel in terms of environmental policies but learned from other municipalities in Iceland that have shown success. The difference is Akureyri's success in creating a holistic strategy by combining and supporting various initiatives under CNAS.

6.1 Future research

In general the framing of urban low carbon transitions (ULCT) needs to be developed to deepen the understanding of various factors and their causal relations with further research, at both local and national scales (Hodson et al., 2013). This is true for the case of Akureyri as well seeing as how young the transition is and how it is greatly gaining traction. Further research analysing influences local transitions have in a national context as well as network alliances between various municipalities with ambitious visions is underdeveloped in Iceland. This is therefore needed to further understand these inevitable transitions.

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8. Appendices

Appendix A

Table 5. Interview details and actor's names

	Name	Date of interview (2017)	Length of interview (minutes)	Sampling method
1	Guðmundur H. Sigurðarson	30th of Jan	110	Purposive
2	Helgi Pálsson	31st of Jan	70	Purposive
3	Sigurður I. Friðleifsson	2nd of Feb	95	Purposive
4	Halla B. Halldórsdóttir	3rd of Feb	30	Purposive
5	Helgi Jóhannesson	7th of Feb	70	Purposive
6	Eiríkur B. Björgvinsson	7th of Feb	90	Purposive
7	Pórarinn Kristjánsson	8th of Feb	80	Purposive
8	Ólöf H. Jósefsdóttir	9th of Feb	100	Purposive
9	Sigmundur E. Ófeigsson	14th of Feb	90	Investigation
10	Albertína F. Elíasdóttir	15th of Feb	80	Purposive
11	Eyjólfur Guðmundsson	16th of Feb	80	Snowball
12	Preben J. Pétursson	17th of Feb	60	Purposive
13	Ingibjörg Isakssen	20th of Feb	45	Snowball
14	Ágúst T. Hauksson	20th of Feb	75	Purposive
15	Kristinn F. Sigurharðarson	21st of Feb	65	Purposive
16	Dagbjört Pálsdóttir	21st of Feb	90	Purposive
17	Jónas Vigfússon	21st of Feb	70	Investigation

18	Jón Birgir Gunnlaugsson	24th of Feb	60	Snowball
19	Hjalti Jón Sveinsson	27th of Feb	30	Investigation

Appendix B

Table 6. Categories and description of actors positions and connection to other entities involved in Akureyris transition

Category 1	Category 2	Position	Additional connection to entity; Board seat or shareholding	
The municipality	Elected municipal representatives	Chairman of former EC	Molta	
		Chairman of ECC	NO	
		Municipal council member	-	
		Former municipal council member Former chairman of EC	-	
	Public officials	Mayor of Akureyri	-	
		Head of environment and executive department	-	
		Head of the municipal Environment Centre	-	
	Public institution/ company	Regional	NO CEO	-
			Former NO CEO Current CEO of the food production firm	Orkey
Chairman of the Vistorka board, employee of NO			Vistorka	
Chairman on the board of Molta			Vistorka	
Molta CEO			-	
Vistorka CEO			Orkey	
Federal		Orkusetur CEO	Vistorka	

		Managing director of a local PPP enterprise	Vistorka
		Rector at UNAK	-
Private business	Strong PPP	Orkey CEO	-
		GPO CEO	Orkey, Vistorka as substitute
	daughter company	Managing director of GN	Orkey

Appendix C

INTERVIEW GUIDE

Interviewee: _____

Date: _____

Location where interview is conducted: _____

- Get permission to record interview on dictaphone

Part	Category	Questions
I.	<p><i>Introduction and base information</i></p> <ul style="list-style-type: none"> ▪ 1. Introduction to research. What kind of questions I will ask and why. ▪ 2. Professional info, current and past 	<ul style="list-style-type: none"> ▪ Job title and your background <ul style="list-style-type: none"> ○ how did you end up doing the job you are doing today? ○ Description of what your current position entails? ▪ Do you currently hold a position on a board of another (relevant) company, or have in the recent past?
II.	<p><i>Positioning of knowledge</i></p> <ul style="list-style-type: none"> ▪ 1. Perception of problem ▪ 2. Perception of concepts ▪ 3. Connection of concepts to profession and field ▪ 4. Municipality as a transition arena ▪ 5. Situating knowledge of low carbon transition concepts and networks 	<ul style="list-style-type: none"> ▪ What is, in your opinion, the most pressing environmental issue that Iceland faces today? ▪ What is, in your opinion, the most pressing environmental issue that municipalities face today? ▪ What is your understand of the following concepts: <ul style="list-style-type: none"> ○ a. Carbon neutralising ○ b. Eco-friendly society ○ c. Sustainability society ▪ Do these concepts relate to the activities in your field of work? if so how? ▪ Do you consider a municipality an optimal unit to tackle systemic unsustainabilities? (e.g. within the waste management system, transport system etc.), why/why not? ▪ Have you heard of, if so where: <ul style="list-style-type: none"> ○ 'Low Carbon Transition'? ○ 'Urban Living Labs' or 'Urban Transition Labs'?

<p>III.</p>	<p><i>Specific questions tailored to interviewee</i></p> <ul style="list-style-type: none"> ▪ 1. General information on the carbon neutralisation process <p>Trends</p> <ul style="list-style-type: none"> ▪ 2. Connections and alignment of initiatives ▪ 3. Drivers, pressures, gains and losses, success factors <ul style="list-style-type: none"> ○ sensing weak vs. strong sustainability values ▪ 4. Recognition of resources, Akureyri's specifics 	<ul style="list-style-type: none"> ▪ What is the role of your <i>respective entity</i> in the carbon neutralisation of Akureyri? ▪ What steps has your <i>respective entity</i> taken towards lowering carbon emission? ▪ What do you see as the most important step that has been taken in Akureyri in terms of lowering carbon emissions? <ul style="list-style-type: none"> ○ Who is/was involved in that? ▪ What do you see as the most important step that is yet to be taken to carbon neutralise Akureyri? <ul style="list-style-type: none"> ○ Who should be involved in that? ▪ How do the different companies and their initiatives interrelate to one another? <ul style="list-style-type: none"> ○ would you describe a connection between <i>respective entities</i>? ▪ What, in your opinion, is the main reason these steps have been taken in Akureyri? ▪ What are the drivers that have placed Akureyri in the forefront in lowering carbon emissions in Iceland? ▪ What is the reason for the success of the implementation of this carbon neutralisation strategy in Akureyri? ▪ What do you see Akureyri gaining from the implementation of these projects? ▪ What do you see as the main barriers to further implementation of low carbon projects? ▪ What do you see Akureyri losing from the implementation of these projects? ▪ What resources (financial and other) has your company got at its disposal to be effective in these projects?
<p>IV.</p>	<p><i>Transition Management information</i></p> <ul style="list-style-type: none"> ▪ 1. Time factor ▪ 2. Future vision 	<ul style="list-style-type: none"> ▪ What is the time element in general of <i>respective entity's</i> projects? (long- or short-time projects) ▪ How many years does policy formulation extend in <i>respective entity's</i> strategic planning? ▪ Does <i>respective entity</i> have a future vision for carbon neutralisation in Akureyri?

	<ul style="list-style-type: none"> ○ a shared vision ▪ 3. Who is engaged ▪ 4. Paradigm shift 	<ul style="list-style-type: none"> ○ If so what is it? ○ Is it a common vision shared amongst other carbon neutralisation initiatives? ▪ Is <i>respective entity</i> trying to reach and activate certain groups more than others? If so, who? ▪ What influence does mentality of people and the culture in Akureyri have on this low carbon development? <ul style="list-style-type: none"> ○ Is it different from the mentality of people and the culture of other Icelanders? ▪ Do you believe that this carbon neutralisation emphasis in Akureyri has effected how people perceive environmental issues or carbon emission? if so, how?
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- Get permission to reference answers given by name in thesis
- Get permission for follow up questions