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1. INTRODUCTION

The transition of the energy system from carbon-intensive to renewable energy is a central topic globally. One of the most famous energy transitions is the so-called *Energiewende* of Germany, which is now also a well-known term for any transition to renewable energy. Austria refers to its energy transition as *Energieautonomie*, but the goals are similar, as they have been defined by the European Union. Large-scale change requires strategic planning on several levels, first of which is convincing people to participate. Convincing people already starts with the stakeholders who are involved in the transition process. In order to be able to promote change, one must be convinced change is possible. Therefore, this thesis focuses on the expert view on one specific energy transition, which is the e-mobility project VLOTTE in Vorarlberg. An energy transition does not only focus on electricity supply or heating, but also includes means of transport. The VLOTTE project team has the ambitious goal to contribute to the decarbonisation of Vorarlberg's transport sector. On the following pages it will be shown how this whole undertaking has started, who the main actors of this transition are, and, last but not least, how these actors make sense of their success.

1.1 PROBLEM STATEMENT

In Austria, 32% of the energy demand is caused by the transport sector. In 2012, the transport sector was the second biggest perpetrator of greenhouse gas emissions, with 95% of these emissions due to road traffic. In the period between 1995 and 2005 the Austrian energy demand rose significantly. This was due to economic and demographic growth and subsequently higher rates in the export industry. Consequently, the use of energy in the transport sector and the number of vehicles and the routes taken by vehicles increased. Passenger services in Austria rose annually by 2% in the time between 1995 and 2008. No significant rise occurred since 2008; however, Austria has the sixth highest passenger density in the EU with 546 vehicles per 1.000 inhabitants. The use of energy rose by only 5% within the timeframe of 1995 and 2008, which is due to the increasing energy efficiency of vehicles. Nevertheless, consumers did not demand more energy-efficient vehicles and the engagement of manufacturers is marginal (Schneider, Simons & Orischnig 2015). By 2050, CO_2-emissions of industrialised nations need to be reduced by 80-95% in order to stabilise global warming at 2°C.[1] As the transport sector is a major contributor to greenhouse gas emissions, the sector is in urgent need of a transition. In Austria the assumption

[1] In October 2018 the IPCC Special Report on Global Warming of 1.5°C was published. The discussion cannot be portrayed at length here, but for further information see: https://www.ipcc.ch/sr15/.

is made that electrification of transport is inevitable, therefore investments have been made in e-mobility model regions since 2008 (Klima- und Energiefonds 2015).

The first Modellregion Elektromobilität was VLOTTE in Vorarlberg. Vorarlberg is recognized as a successful case of the implementation of e-mobility in a region. At first glance, it appears as if the whole state with its different actors is on board with the state's decision to become energy-autonomous by 2050. The local energy provider Vorarlberger Kraftwerke (vkw) states they are supporting the decision by finding new ways of energy provision and by paving the way for the decarbonisation of the transport system through different projects. In 2016, the number of new registrations of e-vehicles (BEV, PHEV) shows that Vorarlberg has the highest share in Austria with 2.76% of all new registrations belonging to e-vehicles. Of 15.189 newly registered M1 class vehicles, 355 were pure e-vehicles. Vorarlberg also has the highest share in this category with 2.3% and lies ahead of Salzburg with only 1.5% (Austriatech 2017).

When talking to people in Vorarlberg, they all seem to approve the transition. One part of the transition is led by policies. The energy strategy of the European Union has been defined by the European Council in the Lisbon Treaty in 2007. The goals state that until 2020, 20% of the green-house gases need to be reduced, renewable energy needs to increase by 20%, and energy efficiency needs to be improved by 20%. In addition, 80 to 95% of the emissions of EU and industrialised countries need to be cut by 2050 (European Commission 2011, p. 4). In the strategy it is defined that consumers need to be given more authority and that the use of energy shall be decoupled from "economic growth" (ibid. p. 7). It also states that "[p]ublic authorities have to lead by example." (ibid.). The transport sector is named as one of the most promising sectors for "energy efficiency gains" and the members of the EU are legally bound to achieve these climate targets (ibid. p. 8). Vorarlberg has adopted the EU's energy strategy in their *Energieautonomie* and their e-mobility strategy. In this thesis it is analysed how the development of VLOTTE has been governed by the state, but foremost by the energy provider vkw as a company owned by the state of Vorarlberg. The making of an energy transition in this case refers to the decarbonisation of the transport sector being one central aspect of an energy transition. The transition process is still ongoing, therefore this analysis can only serve as a snapshot.

1.2 SUBJECT AND RESEARCH QUESTIONS

Before society-wide diffusion of a new technology can take place, pilot and demonstration projects (PDPs) are set up by different actors to assess the functionality, acceptability, usability and scalability. These PDPs are used as a learning ground. Apart from project reports, little is known about the results and the longevity of such PDPs and the tested technologies. Austria has initiated the program e-mobility model region in 2008, with the VLOTTE project being the pioneer testing-site. VLOTTE is also one of three Austrian case studies of the MATCH[2] project, which is part of the 2015 joint call within the ERA-Net Smart Grids Plus initiative. Austria is cooperating in MATCH with Denmark and Norway, by comparing cases and countries to "[p]roduce knowledge on how technical and design aspects, the engagement of different actors, and market decisions influence the success of smart grid demonstration projects (Ornetzeder 2016)."[3] The case study of VLOTTE is especially interesting due to several reasons: E-mobility and the transformation of the transport sector are highly controversial. Every day there are new headlines on the problems of e-mobility, range anxiety, the battery problem of the Western world, the emissions scandal, climate change, particulate matter in the air etc. Obviously, there is an urgent need of a change, but there are also many different groups involved in this process of change. What is reported on often is the failing of innovations or the hindrance of the development by mostly German automobile manufacturers or the lack of adoption of the technology. And then there are so-called successful transitions in e.g. China, where change is forced through political power. However, there is also this small state of Vorarlberg, a different and sometimes oppositional state in Austria, that already 'decided' change needs to happen ten years ago. This is remarkable and it is also remarkably unknown outside of Vorarlberg. The focus in this master thesis is on how the transition has been governed by the state and vkw, what role vkw plays and how experts are making sense of VLOTTE's successful development. Therefore, the leading questions of this thesis are:

1. Who are the actors of the transition and how are they making sense of VLOTTE's success?

[2] For further information on MATCH and the research outcome see https://www.match-project.eu.
[3] In MATCH the interviews with the experts were, among other resources, the basis for the formulation of theories. With the nine case studies in Austria, Denmark and Norway, comprehensive knowledge was collected, analysed and then compared. The aim was to analyse the socio-technical configurations, their implementation in the region, the different role of users and the impact of the solutions on existing energy systems (Ornetzeder 2018). This differs from the research focus in this master thesis, as the expert interviews here are used as resources for systematising the generated knowledge. The experts were part of the VLOTTE project process and through the interviews access to their perspectives and first-hand knowledge was gained. In addition, different theories were referred to in the reports and this thesis.

2. What is the history and development of VLOTTE and the main motivation of the actors?
3. Why do experts think the transition works in Vorarlberg?
4. What has been done to make people participate?

In order to answer these questions, fifteen interviews with experts from vkw, one government institution and a research partner were conducted, in addition to interviews with users from vkw as well as from a cooperating company. These people were either involved right from the start or joined up with VLOTTE at a later stage.

Vorarlberg has taken the EU's climate strategy seriously by following the goals that consumers need to be given more authority and that public institutions need to lead by example. Both goals are clearly implemented in VLOTTE and also stand for the success of the whole undertaking of decarbonising Vorarlberg's transport sector. On the following pages, the program Modellregion Elektromobilität will be explained, Austria's and Vorarlberg's energy and e-mobility strategies described, but centrally the experts' perspectives on the transition analysed. VLOTTE might be part of a transition process to a more sustainable Austria, but it is foremost a strategic endeavour of an energy company facing the decentralisation of the energy sector, therefore entailing a major shift in their responsibilities.

2. THEORIES

The theoretical framework of this master thesis is situated in between the research fields of anthropology of energy, science and technology studies and innovation studies. In this chapter a brief introduction into significant debates of the past and present is given, as well as the research situated within these debates.

2.1 ANTHROPOLOGY OF ENERGY AND EXPERTS OF ENERGY

The research field anthropology of energy has a long history, being subject to change throughout the years. Dominic Boyer separates the field into three phases, beginning with the 1940s and Leslie White (Boyer 2015, p. 621). Leslie White was one of the most prominent originators of anthropology of energy with his analysis of energy, the evolution of culture and the development of civilization. White saw a causality between the enhancement of energy use and cultural, as well as social transformations (Clarke 2015, p. 203; Sperling 2017, p. 43f.). With his approach, White stood in direct opposition to the Boas' school that was dominating anthropology in the US during that time and was therefore not as acknowledged as other theorists (Strauss, Rupp & Love 2013, p. 15; Boyer 2015, p. 622). Even though White's approach was a little narrow, people's use of energy is strongly connected with their social values and their general attitude towards energy. Energy comes from natural sources, but the debate on energy is social, cultural, political and technological (Strauss, Rupp & Love 2013, p. 10f.).

Boyer situates the second phase of anthropology of energy in the 1970s and 1980s, where the focus was placed on indigenous peoples and how they are impacted by energy development. Nuclear power, uranium and oil extraction were of interest and analysed in the context of rights of indigenous communities. These topics are still a central theme in today's anthropological research (Boyer 2015, p. 622; Sperling 2017, p. 44ff.). During that time, Laura Nader started working on energy topics, but had a very different angle and focused on energy consumption and the transition of the energy system. It began with her being appointed to a research group at the Committee on Nuclear and Alternative Energy Systems (CONAES) of the US National Academy of Sciences, where she worked with colleagues from various disciplines on consumption, energy policy and the rebuttal of common misconceptions (Nader 2010, p. 199ff.). Richard N. Adams highlights Nader's work as exceptional in his speech on the lacking commitment of anthropology in energy studies. According to Adams, anthropologists have focused too much on singular events and small-scale research and neglected the bigger picture. Energy concerns everyone on

the planet and therefore is also of major interest for anthropology. He suggests that anthropologists should be more open to new intake and broaden their research field. It is in the tradition of anthropology to borrow from other disciplines and also to analyse society holistically (Adams 1978, p. 307f.).

It took a while until this research field was getting the attention Adams called for. Nowadays, which Boyer also marks as the third phase of anthropology of energy, climate change and the call for energy transitions, as well as decarbonisation of the residential, transport, industrial and commercial sectors has brought this field to the attention of numerous anthropologists. 40 years after the call of Adams, Nader still stresses that the subject of energy transitions and climate change calls for the cooperation between different disciplines, such as social scientists, humanities scholars, engineers, economists, and the general public. Furthermore, she criticises that the energy transition has been perceived as a solely technological problem and that people have been in charge, whose mindsets are set on growth instead of "less is more" (Nader 2011).

In the third phase there are currently three major fields within anthropology of energy: carbon fuels, power and energy, also called energopower, and renewable energy, energy transitions and alternatives to the current energy regime. Research on carbon fuels has its origin in the 1970s and focuses on land-use, indigenous communities, the encouragement of growth and demand. Compared to the 1970s, a closer look is taken today on the political, as well as economic structures apart the global north (Boyer 2015, p. 622). Energy supply and control usually lie in the hand of the state, and through energy, power can be executed over people. Energopower stands for analysing political power through electricity grids, carbon fuel systems and nuclear plants (Boyer 2011).

Renewable energy also stands for a democratisation of the energy system, as everyone could generate and store their own energy through e.g. solar power and storage batteries. There is a close connection to the third field as well. In times of anthropogenic climate change, alternatives to carbon fuels must be found. Tanja Winther wrote a book on the impact of electricity in Tanzania and researched the transition from fossil fuels to hydroelectric power. Her focus was on the applicability of electricity for the environment and she considered the economic and social impact, as well as policies and practices (Winther 2011, p. 2).

The impact of wind power and its infrastructure has been a widely debated topic, not only in Europe, but also in the US. What kind of impact it can have depends on geography and climate.

Texas and northern Germany were subject of an ethnographic landscape project. Even though there are major differences, one conclusion of the authors was that "energy means power" and it does not matter what kind of energy source is in use (Dracklé & Krauss 2011). This kind of anthropological focus falls in what Mari H. Clarke calls engaged energy anthropology. By this she means that anthropologists are now reflecting on their roles in times of anthropogenic climate change and an increasing rate of fatal environmental disasters. Anthropologists are slowly being more present in public debates and take action on a political, as well as academic level (Clarke 2015, p. 215). Franziska Sperling situates her study on biogas and agriculture, also in the program of engaged anthropology. Her focus is on the reorganisation of agriculture to create biomass for energy generation in Germany. According to her, energy has a political role, as energy supply is governed by political institutions. She advocates for a holistic view on political institutions, political programs, energy generation and the individual, in order to work out the nexus of these elements in the German *Energiewende* (Sperling 2017, p. 46ff.).

The research on VLOTTE and Vorarlberg is situated within the so called third phase of anthropology of energy. It is engaged anthropology in terms of taking a closer look at how one part of the energy transition in Vorarlberg is governed. It is also what Laura Nader calls "studying up" (Nader 1972, p. 289). Studying the people and the company who initiated and executed the transition helps to understand why it works. Instead of asking "why are people participating", the question is "what has been done to make people participate"? Everyone is a customer of energy providers and today it is not possible to be part of society without energy. The use of energy is impacted by society's perspective of energy, and the use of energy impacts how energy is perceived. Energy transitions cannot be conducted successfully if the sole focus lies on technological solutions. Cultural and political aspects need to be considered as well (Strauss, Rupp & Love 2013, p. 1of.). The energy transition has an impact on everyone: if a company decides that their employees should use e-vehicles from now on, "studying up" will help to unravel the power play that is at stake. Furthermore, a closer look is taken at Nader's criticism of the people who are in charge in energy transitions. One question is if the people responsible are actually focusing on growth or on a "less is more" approach. This aspect also touches upon the field of anthropology of experts. However, the main interest is not the expert and their business and personal life, but how they are understanding their actions. According to Nader, energy experts often have a straight understanding of their practice and how problems should be solved. This can result in the issue that a problem is perceived as a solely technological one and the social aspect is neglected (Nader 1979, p. 953). In this thesis, the role of the experts and their actions are further examined and by this the implementation of VLOTTE in Vorarlberg is being understood.

2.3 TECHNOLOGY & SOCIETY

Broadly speaking, technology describes all means that humans use to impact their environment and which help them to exceed their natural limits. Therefore, to understand the entanglement of the social as well as the technological, Andrew Barry's concept of the sociotechnical society is made use of. According to Barry, nowadays government and technology are more entangled than they used to be. Government and the nation-state are not limited by spatial boundaries, but defined by technological operations that can also be executed by "firms, international organisations, public organisations and individual persons." (Barry 2001, p. 3). These technological spaces need to be defended like territorial borders. Furthermore, the worth of a country and its individuals is estimated at "intellectual productivity or property, skill or scientific or computer literacy." (ibid.). Technological change happens quickly and the quicker a nation adapts, the higher its value is. Competition is high and this is not only experienced on the national level, but also on an individual level. Citizens need to be technologically informed and educated. The fast pace of technological change is flowing into daily life. An individual needs to be flexible, open-minded and knowledgeable. Expertise is not a sole trait of a certain group of people. "The citizen of a technological society expects and is expected to be informed and updated" (ibid. p. 4). A crucial part of the information contains not only technological devices, but also the human body itself. One's living conditions and health is a choice and therefore one can be held accountable. The claim to be informed comes from different actors and has different reasons. E.g. environmental groups see informed individuals as a way to support pro-environment policies. This also shows that governmental operations are manifold. Barry advocates that a closer look is taken on government operations in daily life and how they unfold. He names a few, such as: "public and private; state and market; the realm of culture (language, identity, cultural institutions) and the domain of nature (the body, sexuality, the environment)." (ibid.) By this he differentiates between government and politics. Government he describes as an activity that is exerted officially and privately. Politics is not necessarily an institution, but a debate that opens up space and possibilities. This also means that the public and the private have been newly defined and the conventional definitions do not apply anymore. Now, if there are conflicts, technology can provide a solution. Especially in international political debates, technology and science can help to settle seemingly unsolvable conflicts (ibid. p. 19f.).

Barry does not differentiate strictly between the social and the technological, as technology plays a distinct role in the establishment of social institutions. This also means that technology itself, as in technical devices, can become political. The controversy over technology and its application can mean a diversification of politics by opening up its arena. Furthermore, Barry speaks of

arrangements of the technical and the social that shape our perspectives. These arrangements consist of "artefacts, practices and techniques, instruments, language and bodies" (ibid. p. 11). Where technology dominates politics and the social, repeatability and comparability become important, which also bears the risk of uniformity and centrality. A positive effect is that it brings a transnational infrastructure into being (ibid. p. 13f.).

Today's society essentially consists of networks. These networks override the formal distinction between the technical and the social. Different political, social and corporate actors engage into networks and work together in projects. Networks are socially established through technology and innovation, as well as they are "technically" established. The different parts of networks cannot be viewed separately and need to be analysed in their mutual dependence. It is also important to take into account the difficulties that networks face when they are newly established, as the process is hardly ever smooth (ibid. p. 15). Here, a similarity to the establishment of innovation resp. the introduction of new technology in society becomes evident. One obstacle of the establishment of an innovation are blockages between systems (ibid. p. 18), such as the blockage between e-mobility and its infrastructure and combustion vehicles that are mainstream. With the help of Barry's theory, the interaction of the different actors in Vorarlberg is analysed, what problems they have been and are still facing and what their ways around such blockages were and are.

Energy decisions are decisions of power and have been dominated by profit interests. Decentralised energy provision is against profit interests as consumers can generate and store their own energy. Therefore, renewable and sustainable energy generation is desirable from a consumer perspective, but contradictory to the interests of major energy providers (Nader 2010). A company whose only business is energy provision is threatening its own business by investing in decentralised energy. Furthermore, e-mobility and the diffusion of alternative transport modes is not part of their business concept. Another aspect of the technical network is that it often is mistaken for a smooth-running system. However, the setup and the maintenance of a network is time-consuming and needs dedicated care (Barry 2001, p. 15). What is of major interest is how stakeholders and experts have approached the social and the technical network, how their maintenance preceding was and what their future plans are. As was mentioned earlier, technology changes rapidly and politics, firms and people have to adapt accordingly. Barry sees active citizens, interaction and feedback culture as one solution to this problem. If firms connect with their customers and consumers, they can react quicker to feedback and demands for change

(ibid. p. 14). However, the energy sector is not known for its rapid pace and start-up mentality; neither is user involvement a key feature of this industry.

To complement Barry's theory of society and technology and bring users more into focus, Harold Wilhite's practice theory and the impact of energy technology on daily practices is drawn on. He challenges the common perception of technology optimism and questions the solutions of reducing barriers to the diffusion of new technologies. Wilhite argues that technology optimists and behaviourists have not studied the relationship between practice and technology in detail, therefore underestimating it (Wilhite 2008, p. 121). In state-of-the-art energy research, technology that helps to reduce climate emissions and behaviour that is climate friendly are still researched separately. This is interesting, as there is a body of research on technology and behaviour, which has been neglected in energy research. Wilhite advocates that technology has an "agentive power on practices" and therefore can transform daily life and affect wellbeing (ibid. p. 122). Practices can be subject to change and how life is lived is a continuing process. In order to induce people to change their behaviour, different strategies can be applied. One is the concept of social learning, which also works as an introduction into a new practice collective. Sahakian and Wilhite draw here on Lave's theory[4], that comprises of two stages: comprehension of the learning subject and participation. It is important to understand that learning is a communal practice and cannot be accomplished by oneself. Furthermore, in politics the motivation of more sustainable consumption is often narrowed down to broad concepts such as living greener or doing something meaningful for the environment. Firstly, these concepts are quite complex and too broad to be integrated into the daily life. Secondly, what has not been looked at are social practices and the impact of change, as well as new technologies. People's lives are not considered and social needs get ignored, which lessens the chance of people picking up new practices. By implementing new practices into a social learning ground, the impact of the changes of habits becomes apparent and it is given meaning (Sahakian & Wilhite 2014, p. 30f.).

[4] See: Lave J (1991) Situating learning in communities of practice. In: Resnick L, Levine JM and Teasley S (eds.) *Perspectives on Socially Shared Cognition*. Washington DC: American Psychology Association, pp. 63–82., and: Lave J and Wenger E (1991/2009) *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.

2.4 STRATEGIC NICHE MANAGEMENT

Strategic Niche Management (SNM) is claimed to be a policy tool by its creators. It "can contribute to successful niche creation for new technological options." (Hoogma, Kemp, Schot & Truffer 2017, p. 29). Seen from the perspective of Andrew Barry and his theory of political machines, this policy tool is also a product of the politicisation of technology. On the following pages the SNM approach is further explained and later in the empirical analysis are the different theories brought together.

Technologies that promise a sustainable use of resources are often new technologies and contradictory to established regimes. Often they are also inefficient and are facing difficulties on several levels. In the past, researchers have studied different ways of novel technology introduction. One is the strategic niche management of Kemp, Schot, and Hoogma. The basis of their theory is that new technologies need a protected space, where experimentation and development of technology is possible. These protected spaces are niches that make technological and social change possible on a small scale. A niche is the application of an idea of a technology, that creates a space for learning and development. The technology is being applied and gradually institutionalized. Within this niche, a network is being established and grown (Kemp, Schot & Hoogma 1998). A pilot and demonstration project such as VLOTTE fits the description of a niche by Kemp et al. Sustainable development builds on the coherence of social and technological change. Therefore, strategic niche management is built on theories from social scientists researching technology and society. It also does not only focus on the implementation of technology, but on future implications that will follow the implementation (Schot & Geels 2008, p. 538). Niches are not solely introduced by governments, but are established with the help of different actors. These actors create a learning environment and pass the process together (ibid.). Usually, if a new product is being developed, the developers face several obstacles starting within their own firm. The development of an innovation commences in a small group of people with little support from the management. Often, a new product is not developed intentionally, but is a by-product of the improvement process of an already existing product. Kemp et al. specifically see this problem in the automotive industry and in a so-called technological regime that hinders the development of more sustainable technologies. In their definition, a regime is a composite of actors, market and technology. This regime is defined by rules that also stipulate the different roles of actors that cannot be disintegrated easily. The rules steer research as well as economic activities. Kemp et al. identify seven factors as common barriers to innovation: "technological factors", "government policy and regulatory framework", "cultural and psychological factors",

"demand factors", "production factors", "infrastructure and maintenance" and "undesirable societal and environmental effects of new technologies". These factors are usually connected and are mutually dependent (Kemp, Schot & Hoogma 1998, p. 177ff.; Hoogma et al. 2017). Furthermore, as these regimes root deeply and change takes a long time and is usually not radical. Established companies with a long history will rather alter their existing products than develop new ones. Regime shifts can occur, but there is no standardised management. Important factors are niches and entrepreneurs who play a dominant role. In addition, the social and ecological environment, the willingness to invest without fear of financial losses, embeddedness of the technology in a wider system with assistance of other technology and social acceptance on the developer's as well as user's side are important. This illustrates the complexity actors have to deal with in order to change an existing system (Kemp, Schot & Hoogma 1998, p. 183).

Previous transitions have shown that different management practices are useful to foster a transition process. Five steps need to be taken to create a niche and manage the transition: "choice of technology", "selection of experiment", "set-up of experiment", "scaling up of experiment" and "breakdown of protection" (ibid. p. 186ff.). The technology of choice should be one that is not part of the existing regime and which fulfils different preconditions. These preconditions are essential, as the technology should help solve a sociotechnical problem without causing too high costs. Therefore, the technology should have the potential of being able to be diffused and break through barriers, be profitable in the long run, fit into an already existing system and fulfil governmental and user needs and be suitable for certain settings. The area of the experiment should benefit of the technology and it should be applied in a specific setting that is not too broad. In the case of VLOTTE, vkw started with the state of Vorarlberg and fleets of the municipality, as well as selected companies and their own fleet. The set-up of the experiment needs to be balanced between "protection" and "selection pressure". Developers should have enough room to experiment, but user needs should be central. Protection should be wisely controlled as the technology is meant to cater to the needs of potential customers and applying pressure will be helpful to focus. When a technology has been implemented, governments can favour the technology by establishing new policy. How the costs will be shared is constantly debated and needs to be decided individually. After a while, protection of the new technology might not be necessary anymore and can therefore be terminated (ibid. p. 188f.). Different actors can manage the transition and usually the responsibility is shared unevenly. Not only governments can be in charge, but also civil societies, companies or other actors.

Kemp et al. highlight in their recommendations, that even though the five step plan is a rough guideline on how to manage a transition, more work needs to be done than just following an instruction (ibid. p. 191f.). The social aspect should not be neglected and persuasion of users and the market is not an easy task. Therefore two criterions help to determine if a transition is successful: "quality of learning and quality of institutional embedding" (Hoogma et al. 2017, p. 5). Two types of learning exist: first order learning and second order learning. First order learning describes learning on design improvement, user needs and policy requirements. As the findings of a project are not known in the beginning, first order learning is the way to these first results. Second order learning is crucial for regime-shift and describes the process of reflection on technology, needs of users and demands from regulation. This can be also named "co-evolutionary learning" and will help the actors to not only reflect on demands from users and markets, but also on their own demands. Institutional embedding means that the first choice of environment of the niche will be further developed and diffusion of a new product to other environments will occur. Three characteristics are key for institutional embedding: supporting technology and infrastructure, anticipation of the product in different contexts as well as plausible results through previous demonstrations, further networking and establishment of a broad alliance of actors, e.g. government institutions, producers, and users (ibid. p. 28f.).

2.5 SUMMARY

In this thesis the three theoretical approaches of anthropology of energy, technology and society and transition niche management are being intertwined. Anthropology of energy can be separated into three phases and this research is situated within the third phase of anthropology of energy, where the focus is on renewable energy, energopower and alternatives to the current regime. It started with Laura Nader's research on the transition of the energy system from the perspective of the people who 'make' the transition and not people who are affected by it. Here, the transition is not seen as a technological endeavour, but as something that is also political and social.

Anthropology of energy is complemented by Andrew Barry's concept of the sociotechnical society, as government and technology are today more entangled than ever before. To make people participate in a transition requires the individual to be technologically informed. Furthermore, which technology is being used is also a political statement. Additionally, the sociotechnical society could not properly function without networks and actors that work together in projects. In the case of VLOTTE, it would not have been possible to engage so many people for one goal without already established collaborations and agreements. Maintenance of such a network is

key and requires the commitment of different actors. Barry's theory helps to get a broader picture of the governance and Harold Wilhite's practice theory focuses on the user perspective. Social learning is a key concept in his theory, which this thesis draws on to understand how people were motivated to participate in the pilot project. A practice change is initiated by orchestrating a communal experience. A green technology is introduced as a group experience in the work, therefore the responsibility is not shifted into private life.

Last but not least, it is made use of strategic niche management, which is a practice approach. Strategic niche management is a policy tool that allows practitioners to introduce a sustainable technology in a protected niche with support from different actors. Unlike the previously described theories, SNM is a way of managing a transition and making sure that an idea can develop into a demonstration and ultimately to a marketable product. It also takes into account that a transition is not just technological, but also social, cultural and political.

3. METHODOLOGY

According to Robert K. Yin, the case study method is suitable for research on a contemporary phenomenon. Furthermore, this contemporary phenomenon is studied in a "real-world context" and the "boundaries between phenomenon and context may not be clearly evident" (Yin 2003, p. 16). Additionally, "various sources of evidence" play a role, the situation that is studied offers "many more variables of interest" and a theoretical framework is beneficial for "data collection and analysis" (ibid. p. 17). In this chapter the applied methodology, the collection of data and the method of analysis are presented and Yin's guideline for case study research loosely followed.

3.1 CASE SELECTION AND COLLECTION OF DATA

VLOTTE started as the first region in the program Modellregionen der Elektromobilität, funded by the Klima- und Energiefonds. In Austria, pilot and demonstration projects are not part of energy policy, but of energy research policy. Energy is mostly the responsibility of the states and not the federal state (Austrian Energy Agency 2018).The program is a way of initiating pilot and demonstration projects in Austria and to bring together different actors. Pilot and demonstration projects (PDPs) are an established instrument and testing bed for innovative technology. PDPs have been an important factor in different industries for the development of solutions to societal needs, such as the development of fibre optics and penicillin, as Frishammar et al. state. The private sector plays an important role, but when it comes to transitions and large scale technology, support from the government is needed (Frishammar, Söderholm, Bäckström, Hellsmark & Ylinenpää 2015, p. 1f.). PDPs offer opportunities for different actors from society, economy and politics to learn about new technologies but also to gain trust and adapt technologies to certain needs. Establishing a new technology comes with high investment costs. PDPs make it possible to monitor the development of a technology and to comprehend why a technology is successful or not (Klitkou et al. 2013, p. 18). VLOTTE is an interesting case study, as it is seen as the pioneer e-mobility region in Austria (Klima- und Energiefonds 2015). In the past ten years, various experiences have been made which can now be assessed in hindsight. Plus, the former project has been transformed into a business model, which underlines the significance of the initiative for the owner vkw.

Traditionally, anthropological research is empirical research, where the anthropologist goes out into the field, collects data, brings it home and analyses it. Analysing the data can be done with a positivist or interpretivist mentality. These two approaches have been turned into two opposite

approaches due to ideology. However, usually these two approaches are combined in research and even though a scientist is working with a positivist approach they still have to analyse and interpret the data. Vice versa this means, that a researcher who uses an interpretivist approach, can still make use of numbers and statistics (Bernard 2006, p. 24). Going out into the field does not necessarily mean that only qualitative interviews or participant observation are done. It can also mean that an anthropologist counts the number of animals that are being consumed by a certain indigenous group or that the electricity use of a household is calculated. In this thesis data from qualitative interviews is made use of. Additionally, data from research reports, previous research output from other researchers, policy advisories, action plans of the state as well as the federal state are collected through desk research and are also valuable input.

This qualitative empirical approach is deductive and inductive. Deductive, as there is a solid body of theory and inductive, as the case study has not been researched yet, apart from the findings of the accompanying research during the pilot project phase. The qualitative guided interviews with experts and stakeholders were conducted in the project MATCH, but can be used for this master thesis. In total 15 interviews with actors were conducted, of which 14 interviews were face-to-face interviews and one was given over the phone. Of the interviewees, ten were experts and five were users. The interviews lasted for approximately one hour. In November 2016, the first round of interviews took place in Vorarlberg. The interviewees are part of the VLOTTE project team and one expert of Vorarlberg Netz. The aim of the interviews was to get an insight into the history of the project, the context, actors, technical and organisational implementation, experiences, success and further development. In May 2017, a second round of interviews took place in Vorarlberg. This time experts of vkw and one user were interviewed. These experts are specialists for certain project tasks. The same interview guide was used for these interviews. On the next day a company that is cooperating with vkw was interviewed. Interviewees were part of the upper and middle management and included one employee with a lower position. The company transformed their fleet into an electric one and also functions as a voice for the (corporate) transition to renewable energy in Vorarlberg. In between these two rounds of interviews in Vorarlberg, other interviews were conducted in Vienna with one representative from the government institution and the accompanying research group. Users in this context are people who are part of the project team, but have minor positions such as working students. Furthermore, the company that is cooperating with vkw is also considered as a user, as they purchase products from the energy supplier.
The interviews were guided, but the questions were fairly open and the main interest was to get to know the different stories. Everyone has their own view on how things started, which parts

were important and how things will develop. Two different interview guides were created, one for the expert interviews and one for the user interviews. It was clearly communicated to the interviewees that their estimation is valid and important and that the interviewers are not interested in standardised answers. Additionally, the whole day was usually spent with the interviewees, which made it possible to get to know each other a little and to establish trust. This is of course not comparable to spending a longer time in the field, but in a business context it is often not possible to stay with the experts for an extended period of time. Experts often have only limited time at their hands and interviews and research is not at the top of their priority list (Bogner, Littig & Menz 2014, p. 27). The research group of MATCH was welcomed warmly by all interviewees, but a longer field trip would not have been possible.[5] However, the limited field visits helped to get an insight into the process, what is going on and what is going to happen in the near future. Vkw is one of the main drivers of e-mobility in Vorarlberg and therefore it was very important to establish a positive relationship with the project managers. They helped with providing contacts to customers and also informed about the actor network that is behind the project. Vorarlberg is fairly small and people know each other. Informal contact is common and official channels are often unnecessary. Knowing people from the inside is important to get in contact with other people involved. The last interview in the summer of 2017 was conducted with an employee of vkw, who lives in a project house. This interview was conducted via phone.

Michael Meuser and Ulrike Nagel were among the first social scientists to propose a method for expert interviews. In this thesis their method for the execution as well as analysis of the interviews is applied (Meuser & Nagel 1991, p. 441ff.). Researchers conducting expert interviews often face the criticism of using an easy access to a research field, as experts are used to interacting with researchers and usually know what the aim of research is (Bogner, Littig & Menz 2014, p. 2f.). However, in this case study experts are the initiators of the project and their perspective of the project is the main research interest. The expert interview is a specific form of open interview, where the focus is on the institutional role of the person. This means the personal life and perspectives of the interviewee are not of interest. The term expert is not clearly defined and there is no standard definition (Meuser & Nagel 1991, pp. 442 & 444; Bogner, Littig & Menz 2014,

[5] For this kind of research participant observation would not have been the most appropriate method. Firstly, the author is not qualified for working with the e-mobility team. Secondly, conducting interviews, studying research reports, government strategies and other published works was more fruitful than engaging with the people on a daily basis. Laura Nader has questioned the applicability of extended field visits for doing research in corporate groups or government institutions and recommended that different kinds of interviews and studying of reports is probably the more appropriate way of doing research in industrialised societies (Nader 1972, p. 306f.).

p. 9ff.). In this context expert means that the person fulfils a vital role in the research subject and can give an insight into the structure of the project. This means that the interviewee gives the researcher access to information and can shed light on internal decision-making processes. Experts are often central figures of the project and have positions in the middle management of an organisation instead of higher in the hierarchy. The reason is that this group of personnel is usually the initiator and driver of decisions within the organisation. Therefore, experts function as representatives of the organisation (Meuser & Nagel 1991, p. 443f.). Hence, experts do not solely have certain knowledge, but their actions also affect other actors and their knowledge acquires its significance through its social effectiveness (Bogner, Littig & Menz 2014, p. 13). The style of guided interviews was chosen to give the expert as much space as possible. As the research focus is on getting inside information, a structured interview would have been too limiting. The guided interview opened up the opportunity to keep to the central theme, but also to develop a conversation that satisfies the interviewer's as well as the interviewee's interest. The guide was divided into sections, which helped to structure the interviews (Meuser & Nagel 1991, p. 448f.).

So far, no general method of analysis for expert interviews exists (ibid. p. 441; Bogner, Littig & Menz 2014, p. 71). Different approaches have been developed, mostly through research practice. Meuser and Nagel propose an interpretive analysis, which needs to be adapted to the subject of research. The interpretive analysis is loosely based on the grounded theory of Glaser and Strauss (ibid. p. 72). As their analysis proposal is not a standardised way to go, it is adapted to the research needs in this thesis.

Analysing the interviews does not mean to extract the individuality of each expert, but to comprehend the overall structure of the organisation. By comparing and contrasting the different statements, it is possible to bring out how the experts interpret their actions and how they situate the project in a wider context (Meuser & Nagel 1991, pp. 447 & 453). The interviews were recorded and transcribed. The transcription had the main goal to document the statements. For the interpretive analysis it is not important when something was said, but that it was said. Every statement is located within the context of the institutional conditions of action and seeing as the experts belong to one organisation, the comparability of their statements is assured (ibid. pp. 453 & 455). This also means that breaks, intonation or other nonverbal communication is not incorporated in the transcription. The second step in the analysis is the condensation of the documents by paraphrasing the interviews and then finding headings for the different sections. Headlines can be generated by using terms the interviewees used, but can also be taken from

the theory (ibid. p. 456ff.). Due to the application of an inductive as well as deductive method, headlines were generated from both. The focus here is again on what the interviewee said and not when it was said. For that reason, text passages can be dissected and interchanged. For now, every interview is treated separately. In the next step the single interviews are combined by looking for similar headings and content. If necessary, different sequences can be brought together or new headlines can be formulated. In the previous steps the focus was on condensing the text, in the next step the texts need to be conceptualised. Former headlines are translated into relevant terms to systematise the statements and research results hence conceptualised. Last but not least, the results from the interviews are brought together with existing theories (ibid. p. 459ff.).

3.2 SUMMARY

The methodological concept of this thesis is case study research. The case selected is the Modellregion Elektromobilität VLOTTE in Vorarlberg. It started in 2008 as a pilot and demonstration project in the program of the Klima- und Energiefonds and the project responsible is the ESCO (energy service company) vkw. It is qualitative research, which is deductive and inductive. Empirical data from interviews with different actors is the main source, complemented with data from reports, press releases and theoretical literature. 15 people were interviewed, of which ten were experts and five were users. For the interviews, two different interview guides were created with open questions to foster free speech. For the analysis, the expert interview interpretive analysis of Meuser and Nagel was applied. Their approach is not standardised and it was adapted to the needs in this thesis.

4. AUSTRIA AND VORARLBERG – CONTEXTUAL KNOWLEDGE

The following chapters will give an insight into Austria's energy and e-mobility strategy, the strategies of Vorarlberg, the background of the Modellregion Elektromobilität VLOTTE and a description of the illwerke vkw group. These will only be briefly described to provide the reader with basic knowledge to contextualise the results of the empirical study. The main part of the empirical case study is the outcome of the interviews with ten experts and five users.

4.1 CONTEXT AUSTRIA

According to Statistik Austria, Austria has an area of 83.879 km² and borders Germany and the Czech Republic in the North, Slovakia and Hungary in the East, Slovenia and Italy in the South and Switzerland and Liechtenstein in the West. The landscape varies greatly, from mountainous areas of the Alps, to the Vienna Basin. The major river is the Danube, the biggest lake is Lake Constance in the West, which also borders Switzerland and Germany, and the highest mountain is the Großglockner between Carinthia and East Tyrol. The Austrian climate is transitional and contingent on the location and varies from oceanic climate to low precipitation with hot summers and cold winters. Austria is a member of the European Union since 1995 and has a population of 8.772.865 (2017). The federal state consists of the nine states Burgenland, Carinthia, Lower Austria, Salzburg, Styria, Tyrol, Upper Austria, Vienna and Vorarlberg. The capital is Vienna, there are 95 administrative districts of which are 15 statutory towns and 2100 municipalities (2017) (Statistik Austria 2018).

The population of Austria is on the rise and Vienna is the most populous municipality with 1.87 million people. Since the 1990s the migration to Austria has been increasing. In 2017 there were 1.34 million non-Austrian people living in Austria. 67.1% of the population is between 15 and 64 years old and in an economically active age. 6 out of 7 working people are employees (87%) and 13% are either self-employed or work in businesses owned by their families. The rate of the working population is at 72% and therefore higher than the EU average with 67%. The Austrian population dwells in 3.86 million private households, of which 63% are households with more than one person and 37% are single households (2016) (ibid.).

The politics of the Democratic Republic of Austria have been dominated since 1945 by the two parties of the Austrian People's Party (ÖVP) and the Social Democratic Party of Austria (SPÖ). Since the early 1990s, the Freedom Party of Austria (FPÖ) has been becoming more popular with

a drop down in popularity in the early 2000s. Since December 2018, a coalition between the ÖVP and the FPÖ is ruling the country with Sebastian Kurz (ÖVP) as chancellor and Alexander Van der Bellen as president, who is a former member of the Green Party. Besides general elections, referenda, plebiscites and people initiatives are ways of exerting direct democracy. On 5th November 1978, 50.5% of the people of Austria voted against the nuclear power plant in Zwentendorf in a referendum. The only other occasion a referendum took place was on 12th June 1994 on the question of the Austrian EU membership. People initiatives have occurred more often (ibid.).

4.1.1 ENERGY STRATEGY OF AUSTRIA

In the Austrian energy policy system, responsibility is divided between the federal government and state governments. On the federal level the responsibility is on "energy taxation, energy statistics, energy metering, energy supply emergency regulations", on the state level there is responsibility for "electricity, gas, district heating, energy conservation, subsidies and prohibition of nuclear power"(International Energy Agency 2014).

Pillars of the Austrian Energy strategy are energy efficiency, guarantee of energy supply and renewable energy. In 1974 the Austrian government published their first energy research concept, which has been updated continuously. Over the years the funding scheme has been changed according to global energy politics. Nevertheless, the topic energy has always been a topic of great relevance and society, firms as well as politics have been working together ever since. In 2009, the BMVIT together with the Österreichische Gesellschaft für Umwelt und Technik (ÖGUT), Rat für Forschung und Technologieentwicklung and the Austrian Energy Agency published a report to propose a catalogue of measures for the Austrian Energy Strategy. Central were the reduction of greenhouse gases, energy efficiency, renewable energy and the increase of research funding. These were not only proposed measures, but also guidelines from the European Union. Major goals of Austria's energy policy haven been: security of supply, environmental capability and cost efficiency. In 2009, these were supplemented by social acceptability and competitiveness. Innovation and research are key for these goals (Paula, Cerveny, Gadner & Indinger 2009).

In 2013, the government stated that besides the aforementioned foci decarbonisation, development of network and duration of planning are key. It was planned to develop an energy strategy to 2030, expand renewable energy and further reduce GHG emissions in the transport sector. It was planned to stabilise the energy consumption 2020 at the level of 2005, which was 2% lower

than 2011 (International Energy Agency 2014). In 2016, 63% of the Austrian energy was imported, which is more than the EU average with 55.2% (2015). When it comes to renewable energy, Austria is mostly independent, but renewables make only 29.9% of the total energy expenditure. However, 71.7% of the Austrian electricity comes from renewables. Statistik Austria claims that energy efficiency measures are crucial, not only because of climate change, but also to limit the Austrian energy dependency. In the past 40 years the energy consumption has nearly doubled and major increases were recorded in wastes, gas and renewable energy. From 2015 to 2016, the energy consumption in the traffic sector increased by 2.2% and the amount of energy consumption in this sector was 34.4% (2016) (Statistik Austria 2018).

In 2018 the Integrierte Klima- und Energiestrategie (IKES, integrated climate and energy strategy) was made contractual. The Austrian Energy Agency summarised it with the following key points:

- General commitment to the climate goals of the EU and increase of renewable energy production.
- 100% electricity from renewable sources by 2030.
- Existing incentives and measures will be evaluated and a stronger market orientation established.
- Sustainability, competitiveness and security of supply should be balanced.
- Medium-term phase-out of oil-fired heating in new buildings.
- Medium-term phase-out of coal.
- Policy of anti-nuclear power and anti-coal power will be extended to EU level.
- Full decarbonisation of the mobility sector by 2050 (Austrian Energy Agency 2018).

In addition to the energy strategy, an energy research and innovation strategy was formulated in 2017. It is an update of the energy research strategy from 2010. According to the Austrian Energy Agency, the topics are: energy system and grids, buildings and urban system, industrial energy systems, traffic and mobility system, transformation and storage technologies and transition processes and social innovation (ibid.).

The current government is being criticised for their marginal energy strategy by environmental organisations such as Global 2000. Even though problems and challenges are identified, the government programme lacks suitable measures. Economic interests are a priority and are counter posed to environmental interests. Global 2000 points this out as a gross misunderstanding,

seeing as the environment is the livelihood. The goals for climate and energy are not ambitious enough and other projects such as the enhancement of Vienna airport are favoured over limiting emissions. However, there is a plan for formulating a climate and energy strategy in which one aim is a complete decarbonisation by 2050. Additionally, the government is planning on funding green mobility and to implement incentives that are also socially acceptable (Global 2000 2018). Nevertheless, the efficiency of the strategy and the measures can only be assessed at a later time.

4.1.2 E-MOBILITY STRATEGY OF AUSTRIA

Traffic emissions increased by 71.8% in the mobility sector of Austria since 1990 (Umweltbundesamt 2019a). In 2016 it was the second biggest emission factor with 29%. Almost 90% of road traffic was relying on petroleum and 6% relied on biogenous fuel (Austrian Energy Agency 2018). Emissions increased by 2.9% in 2017 in comparison to 2016, due to the rising demand of fossil-based fuels (Umweltbundesamt 2019a). Until 2030, it is predicted that the traffic density will increase in the passenger services by 25% and the freight traffic by 33%. The favoured means of transport is the motorcar (73%) followed by public transport (24%), the bicycle and going by foot (3%) (Bundesministerium für Verkehr, Innovation und Technologie 2016).

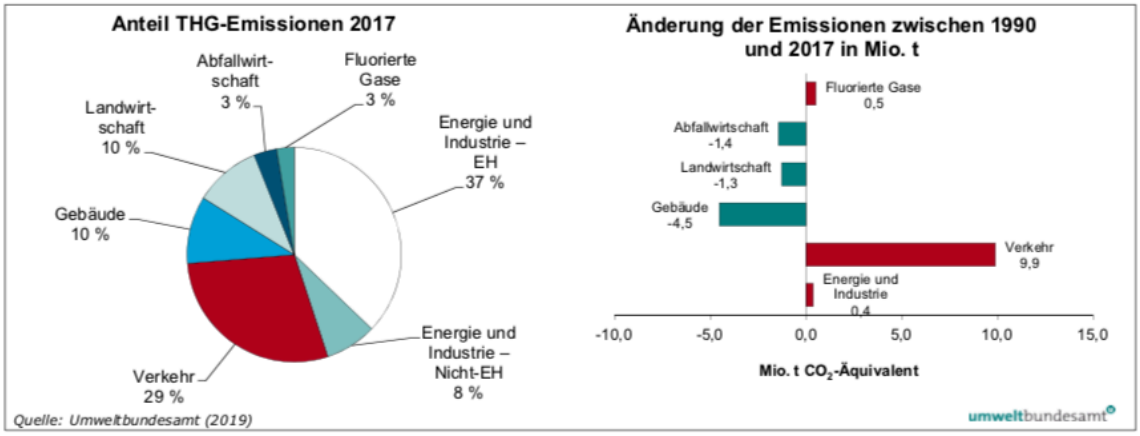

Figure I: Greenhouse gas emissions and sectoral amount of 2017 and change of emissions from 1990-2017. Source: (Umweltbundesamt 2019b).

According to the Umweltbundesamt the greenhouse gas emissions goals of 2017 were not achieved in the sectors traffic, buildings, agriculture, waste industry and all other sectors that are not regulated by emissions trading. In the time between 2013 and 2016, the goals were undercut and therefore included in the calculation of the climate goals until 2020. However, it is not for certain that the climate goals will be reached. Austria needs to cut its emissions by 36% until 2030, in comparison to the year 2005. To achieve this, major changes need to be applied (Umweltbundesamt 2019c). To reduce emissions, alternatives for the transport sector need to be

found, developed, tested and diffused. Furthermore, the whole societal mobility attitude needs to be questioned and changed (Austrian Energy Agency 2018).

One favoured way of decarbonising the transport sector is the acceleration of e-mobility. In 2009, the Austrian Energy Agency published the report *Pre-Feasibility-Studie zu 'Markteinführung Elektromobilität in Österreich,* where the societal, technological, economic and environmental basic conditions for the wider diffusion of e-mobility in Austria was assessed. During that time, e-mobility was still in an experimental phase, as serial models did not exist and the few models which were on the market cost between 25.000 and 100.000€. The market share rose from 128 e-vehicles in 2004, to 146 in 2008 (Austrian Energy Agency 2009). These numbers are still far from today's numbers, but they were a start. In the paragraph on e-mobility competences in Austria, energy providers are listed but the competences range from having one e-vehicle in the fleet, to being supportive and participating in model projects (ibid.). It is clear that energy providers need to be part of e-mobility projects, as the decarbonisation of the transport sector is only feasible if the electricity for the e-vehicle comes from renewable energy sources. During that time, however, no company was aspiring to become an e-mobility knowledge hub. As e-vehicles were more expensive than conventional vehicles, financial support was needed to accelerate the diffusion. In Austria, the Klimaaktiv Mobil funding program is apart from the Klima- und Energiefonds (Climate and Energy Fund), the main funder of e-mobility projects. In the time from 2007 to 2015 a total of 5058 (83.3%) corporate mobility initiatives were funded, 767 (12.6%) mobility initiatives in regions, cities and municipalities, 177 (2.9%) bicycle traffic initiatives and 71 (1.2%) tourism and leisure initiatives (BMLFUW 2016).

In 2016, the readiness level of e-vehicles in fleets in Austria was assessed. Even though the technology showed a rather high readiness level, the general diffusion of e-vehicles in Austria was rather low. E-fleets mostly existed in the frame of pilot and demonstration projects, but were hardly found apart this frame. Building of charging infrastructure has been an interest for several years, but the demand was lacking. The conclusion of the report was that the technology exists, but user experiences were sparse since not many fleets existed. Problematic was also the lack of binding rules and the low acceptance rates of e-mobility in the public (Ornetzeder, Capari & Gutting 2016, p. 60ff.). Nevertheless, policy is favouring e-mobility and one tool are the Klima- und Energiefonds programs.
The Klima- und Energiefonds (KLIEN) was initiated in 2007 and is part of the Bundesministerium für Nachhaltigkeit und Tourismus (Ministry of Sustainability and Tourism) and the Bundesministerium für Verkehr, Innovation und Technologie (Ministry for Transport, Innovation

and Technology). Since 2007, 195 calls were tendered, 27 programs developed and from 2007 till 2015 a total of 110.000 projects funded. The central interest of KLIEN is "Zero Emission Austria" and with their programs they are trying to make Austria independent of oil and gas imports. To reach this goal, research and development on sustainable energy technologies and climate research is funded, in addition to projects on public transport, freight traffic and mobility management and projects that foster the diffusion of climate friendly and sustainable energy technologies (Klima- und Energiefonds 2019).

The first e-mobility funding program was simply called *Elektromobilität*, which aimed at introducing e-mobility into the Austrian market. The target audience were municipalities, companies and research institutions. It focused on bringing together individuals, companies and politics to demonstrate the feasibility of e-mobility in a region (Klima- und Energiefonds 2008). One year later, several tenders followed, such as *Klima- und Energie-Modellregionen*[6], *Technologische Leuchttürme der Elektromobilität*[7] and *Modellregionen E-Mobilität*[8]. E-mobility regions were only established in the time from 2008 until 2012. For KLIEN, seven Modellregionen der Elektromobilität were enough, but smaller projects within these model regions were still funded from 2012 until 2015. Here, either the model region project managers could hand in proposals to tenders or partners could propose project ideas. The main aim was to bring the model regions together, to exchange knowledge between different actors and to promote innovation. The model regions are understood as spearheads of innovation and creation and therefore ten to twenty smaller projects were funded per year. Model region funding amounted to 1 to 3 million euros, but the smaller projects were only funded with roughly 100.000 euros.[9]

In 2018, the funding objective has shifted from the main target group being companies, to the main target group being private people. One example is the program *E-Mobilität in der Praxis*, which builds on the success of the program *Modellregionen Elektromobilität* and tries to make e-mobility more accessible. The focus is on making the public aware of already existing technologies and e-mobility offers that have been proven successful in pilot and demonstration projects (Klima- und Energiefonds 2018a). This is not perceived as a different phase of government funded projects, but it has reached a wider audience. Modellregionen or pilot and demonstration

[6] https://www.klimafonds.gv.at/wp-content/uploads/sites/6/LeitfadenKlima-undEnergieModellregionen.pdf
[7] https://www.klimafonds.gv.at/wp-content/uploads/sites/6/LeitfadenLeuchttuermeeMobilitaet.pdf
[8] https://www.klimafonds.gv.at/wp-content/uploads/sites/6/LeitfadenAusschreibungModellregionElektromobilitaet.pdf
[9] INT-5 2017.

projects are not necessary aimed primarily at people getting in touch with a technology, but the technology has already proven its suitability and is ready for mainstream diffusion.[10]

Next to funding programs, other incentives have also been active. Some cities and regions in Austria have free parking for e-vehicles. In April 2017, the e-number plate was introduced, which is a coherent identification and makes it easier for e-vehicle drivers to make use of free parking offers. Before the e-number plate, local warrants needed to be issued (Bundesministerium für Verkehr, Innovation und Technologie 2017). On the federal state level, several other incentives have been introduced. There is the possibility of creating specific parking spaces exclusively for charging e-vehicles. This is supposed to make charging easier, as regular vehicles are not allowed to be parked there. Additionally, tax incentives were introduced, such as an exemption from the engine-related insurance tax, exemption from the motor vehicle tax, exemption from the car registration tax (Normverbrauchsabgabe). E-vehicles are also VAT deductible (if bought for a company) and no fringe benefit will be added to the payroll tax if a company car can also be used for private needs (certain conditions apply) (Klima- und Energiefonds 2015; Bundesministerium für Verkehr, Innovation und Technologie 2017, p. 28).

The current government has announced the "#mission2030 'E-Mobilitätsoffensive'", with a funding sum of 93 million euros for 2019 and 2020. The focus is on e-mobility for vehicles and infrastructure, e-mobility on tracks as well as e-mobility management, e-fleets and e-logistics. The offer is for private people and companies and ranges from 200€ for an e-bike to 100.000€ for an e-bus (Bundesministerium für Verkehr, Innovation und Technologie & Bundesministerium für Nachhaltigkeit und Tourismus 2018). Funding of infrastructure is one essential point of the E-Mobilitätsoffensive. The Bundesverband Elektromobilität has issued a statement, that the charging infrastructure of Austria has grown by 30% since 2017 and there are now 4.866 charging points that are publicly available (2019). Lower Austria is leading with 1.217 charging points, Upper Austria 673, Styria 630, Vienna 616, Carinthia 497, Tyrol 430, Vorarlberg 399, Salzburg 277 and Burgenland with 127. The EU recommends one charging point for ten e-vehicles, in Austria there are currently four e-vehicles per charging point (Bundesverband Elektromobilität 2019).

[10] Ibid.

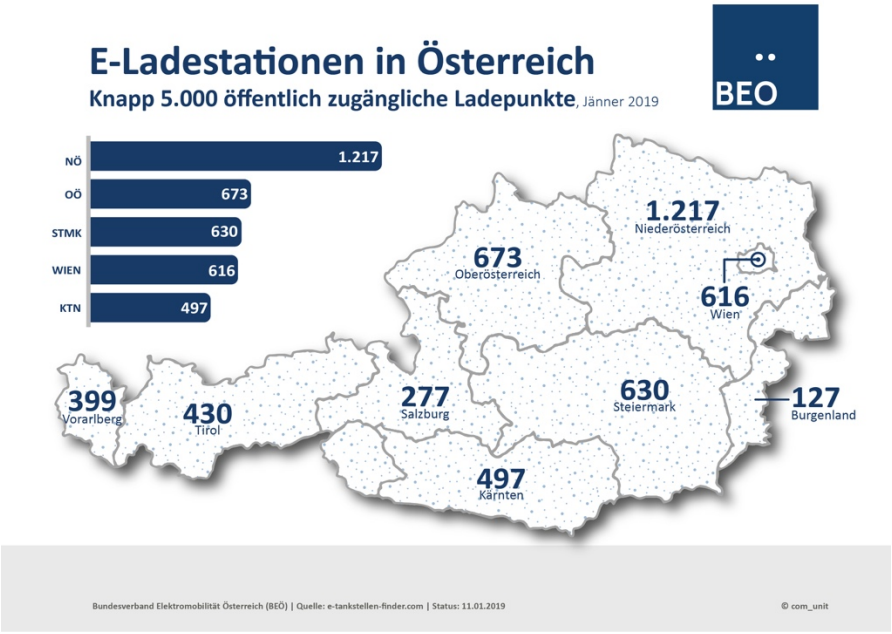

Figure II: Charging points around Austria. Bundesverband Elektromobilität, (ibid.).

KLIEN states that so far, the charging infrastructure has not been standardised yet. Eleven energy providers are cooperating with each other and KLIEN. This makes it possible to use these charging points with just one chip card and/or app. The company Smatrics and Tesla also provide charging infrastructure (Klima- und Energiefonds 2018b). Another thing one needs to keep in mind, is that the charging plugs are not standardised either. Therefore, every vehicle has its own charging peculiarity and one has to have their needed charging cable in the vehicle boot.

4.2 CONTEXT VORARLBERG

According to Statistik Austria, the state Vorarlberg has a population of 388.752 (2017), an area of 2.601 km², four districts (Bludenz, Bregenz, Dornbirn, Feldkirch) and 96 municipalities. It has the highest per capita export rate of goods with 24.766 euros (2016), 15.400 people of the working population are border-crossers and work in Liechtenstein, Switzerland and Germany and the gross domestic product per bread-winner is 85.900 euros, second after Vienna (2016). The number of people under 15 years amounts to 16.1% and therefore Vorarlberg has the youngest population. As of 2016, 16.9% did not have an Austrian passport and there were only 3.4% of unemployed people. The overall productivity of green electricity was 100%, with 3.627 GWh. It is also the only state where an Alemannic dialect is spoken (Statistik Austria 2018).

Nation states, states and regions are mostly created through political power and regional identity is constructed within such a context. Alois Niederstätter denotes regional identity as an ideological construct that does not develop over time and then persists, but gets created to match political needs. States and the so-called cultural awareness of people living in the states are defined as a regional identity which differentiates these people from people living in other states. He refers to Edwin Berndt's surveys on the identity of people of Vorarlberg and that the results were surprising to some individuals (Berndt 2003). Apparently, Vorarlberg was usually seen as a state with a focus on diligence, frugality and a distinct dialect. However, in the early 2000s, Vorarlbergians stated that to them the landscape of mountains and lakes is a distinct characteristic of their home state and the aforementioned qualities do not matter as much as during the time after the second world war (Niederstätter 2010, p. 10f.). Additionally, Markus Barnay states in his monography on the invention of the Vorarlbergian, that a certain characteristic of the people is actually a political invention. He refers to the example of the so-called Vorarlbergian urge to a private home. To own a home is not a birth-given characteristic, but results from the traditional divided inheritance of land, the lack of metropolitan areas and the socio-politically motivated funding of building a private home. By inventing a certain characteristic, Barnay claims, cause and effect are interchanged. Political force is misinterpreted as a characteristic and this is a common practice of elites to authenticate their actions (Barnay 1988, p. 473). The interviewees were asked if the success of VLOTTE can be explained by VLOTTE being situated in Vorarlberg. Their explanations give an insight into the reasoning of the experts, but a closer look also needs to be taken on Vorarlberg's energy and e-mobility strategy, instead of trying to draw a picture of a distinct state in Austria.

4.2.1 ENERGY STRATEGY OF VORARLBERG

The goal of Vorarlberg's *Energieautonomie* is to cover the regional energy demand by 2050 only with renewable energy (Amt der Vorarlberger Landesregierung 2019). *Energieautonomie* does not mean that the state wants to become autonomous or autarkic, but it is the Austrian equivalent to the German *Energiewende*. The *Energieautonomie* 2050 is a strategic goal of the state, which is based on a high commitment of Vorarlberg's people. In 2009, the Landtag decided unanimously for the implementation of the *Energieautonomie* and called the program Energiezukunft Vorarlberg (Amt der Vorarlberger Landesregierung 2010). However, already in 2007, the pillars of the strategy were developed in workshops with experts from different fields who voluntarily participated in the visioneering process. The fields of expertise were communication, hydroelectricity, biomass, biogas, sun, spatial planning, industry, buildings, mobility, and electricity of small-scale consumers. The results of the workshops were the formulation of recommendations for action for different actors (ibid.). The strategy contains several steps that need to be taken over the years and these steps can be subsumed under six central themes:

- forward-looking policy with sustainability principles
- intelligent and efficient energy systems for generation and consumption
- sustainable structures for a high quality of life
- energy in training and innovation
- symbols and values for a sustainable lifestyle
- regional value-creation and competitive advantage (ibid.)

The group of experts worked out seven fields of action that are crucial for the *Energieautonomie*:

- legislation
- incentive schemes
- education and counselling
- structures and networking
- energy-related spatial planning
- innovative products and services
- public relations and awareness raising (ibid.)

In a next step, additional workshops with experts took place, but these workshops centred on the implementation of the visions from the previous seminars. The aim was to formulate goals that need to be realised by 2020. This timeframe was chosen with the EU-2020 goals in mind,

but are also part of the larger planning until 2050. This time working groups with the topics renewable energy, buildings, industry and trade were built (Amt der Vorarlberger Landesregierung 2014). The result of these workshops were the *101 enkeltaugliche Maßnahmen* (101 measures suitable for grandchildren) and according to the Landesamt Vorarlberg the most important goals are:

- Sustained renovation rate for buildings from 3% and reduction of energy consumption for space heating by 20% on average
- Annual increase in efficiency in the manufacturing industry economy of 1%
- Extension from 200 to 220 GWh hydropower
- Construction of 15.000 m² of solar plants per year and annual extension of more than 40.000 m² of photovoltaics
- Approximately 50% increase in total holdings of heat pumps until 2020
- Relocation of an additional 5% of passenger traffic for short and medium distances on the bicycle traffic
- 5% share of electric drive by 2020
- Rail share of freight, destination and source traffic from 22% to 30% by 2020 (ibid.)

In 2012, it was decided by the Landtag to accept the *101 enkeltaugliche Maßnahmen* and this led to a practical implementation of the recommendations for action. Roughly 70 experts worked on refining the measures in several workshops and in the end, they agreed on 40 prioritised measures. The general goals are to lower the energy consumption by 15% in comparison to 2005 and to reduce the CO_2-emissions by 18% and increasing renewable energy by 19% (ibid.). In 2018, a monitoring report of the *Energieautonomie* was published and the status of the different measures stated. Apart from a few cases, the majority of cases have been implemented and are running. Only a negligible number of cases is currently on hold or is not pursued further (Amt der Vorarlberger Landesregierung 2018a).

4.2.2 E-MOBILITY STRATEGY OF VORARLBERG

Even though Vorarlberg has a concept to lower emissions and reduce the energy consumption with the *101 enkeltaugliche Maßnahmen*, Vorarlberg also has an e-mobility strategy. Within, strategy goals and 32 concrete measures are formulated for the period between 2015 and 2020. The aim is to bring 10.000 e-vehicles, 20 e-busses and 500 utility vehicles on Vorarlberg's streets (Landespressestelle Vorarlberg 2015). It is a further development of the mobility goals of the *101*

enkeltaugliche Maßnahmen, but is also based on the concept of the Modellregion Elektromobilität. In the strategy paper, the Modellregion is specifically mentioned as a particular starting position. The goal is not to exchange combustion vehicles with e-vehicles, but to use e-mobility as a complimentary technology that supports the sustainability goals of Vorarlberg (Amt der Vorarlberger Landesregierung 2015). Four fields of action are mentioned:

- making e-mobility accessible to a wider audience
- to bring e-mobility to companies, public institutions and private people
- e-mobility contributes to a better air quality and therefore should be used in fleets as well as in motorbikes
- to bring e-mobility into fields where the performance of the technology can be demonstrated, such as in transporting goods, agriculture and construction (ibid.).

Within these fields of action different sectoral goals and measures are formulated. The goals are:

- the implementation of e-busses and the connection of e-mobility options with public transport
- further diffusion of e-bikes
- to further research possibilities of e-mobility for special vehicles and in agriculture
- to increase the number of e-vehicles in fleets of public institutions and municipalities
- new private and public buildings come with cable routes so charging infrastructure can easily be established
- public charging infrastructure is expanded
- different awareness and communication projects are initiated to increase acceptability in the public (ibid.)

To further involve the public, a council of citizens was nominated in June 2018. The idea behind this concept is to bring the public in closer contact with politics, administration and institutions. The people were assigned randomly to ensure diversity. 600 people were nominated, 100 people reacted to the nomination, 31 signed up and 65 rejected the nomination. 28 people showed up at the council meeting, of which 11 were women and 17 were men. The youngest was 19 years old and the oldest 75. Until mid-2019, the mobility concept of Vorarlberg will be revised by a group of experts in cooperation with the citizen council. The results of the revision will also be considered for the revision of the bicycle strategy and the *Energieautonomie* (Amt der Vorarlberger Landesregierung 2018b, p. 4ff.). The report on the citizen council summarises the results of the

workshops as following: importance of awareness-building, strategic transport policy, Vorarlberg being perceived as a pioneer region in technology and digitalisation, nexus of different means of transport, prioritisation of public transport, support of bicycle traffic and needed infrastructure, turning away from fossil-fuel based individual transport means, appreciation of going by foot, improvement of logistics transport in housing areas and support and funding of companies that want to improve their mobility concepts and work on their employees' mobility behaviour. These results will be handed over to the state government and approached in cabinet meetings. A publication of the discussed guidelines is planned to be made public in Spring 2019 (ibid. p. 7ff.). So far, it seems as if the government of Vorarlberg is not only upholding the myth of closeness to citizens and considering public opinions, but is actually trying to implement ways of public democracy. However, the success of these measures will only be able to be assessed in retrospect.

4.3 ILLWERKE VKW

In 2000, the two companies Vorarlberger Illwerke AG (Illwerke) and the Vorarlberger Kraftwerke AG (VKW) were merged to the group illwerke vkw. The companies are still independent, but have one management. The state Vorarlberg is the majority shareholder of Vorarlberger Illwerke AG with 95.5% and the WEG Wertpapiererwerbsgesellschaft m.b.H. owns 4.5%. The WEG is also owned by the state Vorarlberg, therefore Vorarlberger Illwerke AG is in the hands of the state Vorarlberg. The Vorarlberger Kraftwerke AG is in the ownership of the Vorarlberger Illwerke AG (illwerke vkw 2017, p. 16). The maintenance and the development of the power plants is the responsibility of the Vorarlberger Illwerke AG. The energy distribution, energy services and trade of electricity and natural gas is managed by Vorarlberger Kraftwerke AG. Their field of operation is not only Vorarlberg but also the western Allgaeu. Different subcompanies are also part of the group (ibid. p. 17). The Vorarlberger Kraftwerke AG is responsible for e-mobility and VLOTTE is a brand of the company (vkw 2019a).

Illwerke vkw presents itself as a group dedicated to sustainability by acknowledging the principles of sustainable actions in different fields: relationships built on appreciation and reliability, economy in the region, protection of the environment, social responsibility, culture in the region, and technology for several generations (illwerke vkw 2017, p. u2).

In 2013, ten companies in Vorarlberg founded the Klimaneutralitätsbündnis 2025 (climate neutrality alliance) and illwerke vkw was one of them. The idea is to support the 2°C-goal of the

United Nations by lowering and also compensating carbon emissions. In 2017, the alliance counted 101 members in Austria, Germany, Switzerland and South Tyrol (ibid. p. 48).

4.4 MODELLREGION ELEKTROMOBILITÄT VLOTTE[11]

VLOTTE was the first Modellregion Elektromobilität in Austria and the only application that was accepted in 2008.[12] In the period of 2008 to 2015 seven regions were established:

- Vorarlberg (VLOTTE, 2008 and 2009)
- Salzburg (ElectroDrive Salzburg, 2009)
- Vienna (e-mobility on demand, 2010)
- Graz (e-mobility Graz, 2010)
- Lower Austria (e-pendler in niederösterreich, 2011)
- Carinthia (E-LOG Klagenfurt, 2011)
- Vienna (E-Mobility Post, 2011) (Klima- und Energiefonds 2015, p. 6)

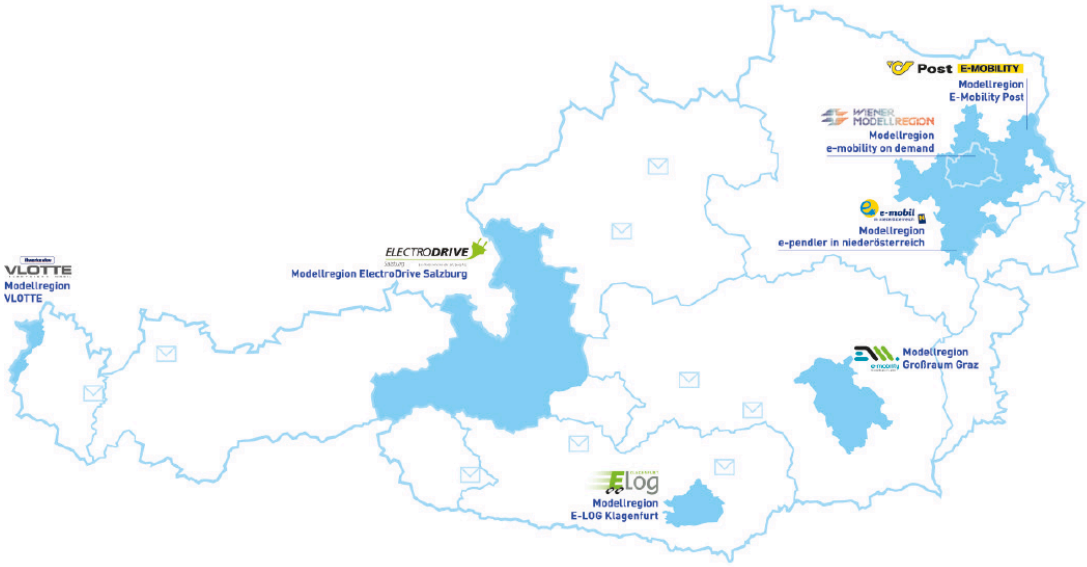

Figure III: Modellregionen der Elektromobilität. (Klima- und Energiefonds 2015).

[11] Some parts of the empirical data on VLOTTE have been published in the MATCH project deliverables D2.1 and D3.1. The paragraphs on VLOTTE in D2.1 have been written by the author of this thesis under supervision of Michael Ornetzeder (ITA ÖAW), except for the "sociotechnical configuration smart energy trial household" which was written entirely by Michael Ornetzeder. In D3.1 the author has cooperated with Tomas Moe Skjølsvold (NTNU) in writing the chapter "Renewable powered company fleet as a smart energy solution", also under the supervision of Michael Ornetzeder. The deliverables can be accessed here: https://www.match-project.eu/digitalAssets/344/344917_d2.1_austrian-case-study-report_match.pdf and https://www.match-project.eu/digitalAssets/438/438337_match_d3.1_v2.pdf.

[12] INT-5 2017.

In the report on six years of e-mobility model regions, VLOTTE is introduced as the groundbreaker for e-mobility in Austria. It is also described as a very successful project that has proven e-mobility's suitability for daily use. Within three years, 357 e-vehicles were brought to the streets of Vorarlberg, 159 public charging points and three fast charging points. Different models were used, but the most common was the Citroen C-Zero with 183 vehicles, followed by 69 i-MiEV and 44 TH!NK vehicles as well as others. 757 m² of photovoltaics were in use on the premises of vkw in Bregenz, in Krumbach and Lingau. Additionally, a small hydropower plant in Brunnenfeld was taken into operation in 2011 (vkw 2013; Günther 2014).

The numbers for 2017 say that in Vorarlberg 327 e-vehicles and 20 electric delivery vehicles were licensed. The Mobilitätszentrale lent their e-vehicles a total of 300 times, 500 consultations were conducted and 1.400 people visited (illwerke vkw 2017, p. 47). The success of VLOTTE is depicted in the opening of a branch in Salzburg, where e-mobility products for hotels, the food service industry and companies are offered (ibid.).

4.4.1 HISTORY

VLOTTE covers the region of the Rhine Valley and its surroundings, which counts 366.000 people (vkw 2013). In the early days of the program the focus was on trying out e-mobility for different user groups and in different fields of practice. The aim was to test the applicability of e-mobility. The applicants had to develop a mobility concept that considered e-mobility and the needed infrastructure. The electricity consumption needed to be fully covered by electricity coming from additional renewable energy sources. Next to the technical installation, accompanying research was also a requirement, as well as monitoring (Klima- und Energiefonds 2015, p. 8). Important to the funder was that the risk was not on the customer, but on the project manager. An operating company had to hand in the proposal and through this project managing company the e-vehicles, the charging infrastructure and the renewable energy had to be diffused in the region. With this condition, the Klima- und Energiefonds wanted to keep the risk from the consumer and keep it with the operator.[13] In the beginning vkw was not the initiator, but the independent non-profit organisation Kairos – Institute for Impact Research and Development in Bregenz. Their mission statement on their website is "to develop prototypes, that advance our world in an ecologically and socially just way." (Kairos 2019). In 2008, Kairos was commissioned by the state government of Vorarlberg and vkw to write the application for the program

[13] Ibid.

Modellregionen Elektromobilität of the Klima- und Energiefonds. The impetus to make vkw the main entity responsible for the project came from the state government.[14]

VLOTTE is based on the previous project minus99, with the intention to prove the daily suitability of e-vehicles. Minus99 started in June 2008 and the aim was to bring 99 e-vehicles on the streets of Vorarlberg within three years. At first, 15 e-vehicles were tested and after the satisfying early experiences a wider diffusion in Vorarlberg was aimed at. The overall goal was to promote e-mobility and foster acceptance from the public. Kairos calculated that in the years of 2011 and 2012, more e-vehicles will be available on the market and the already made experiences in the project will be beneficial. Partners were companies, parishes, municipalities, social institutions and church sponsors (VCÖ 2008). Nowhere it is clearly stated that minus99 was carried through. Also, on the website of Kairos minus99 is only mentioned under the heading of the project VLOTTE. Therefore, it can be safely assumed that minus99 merged into VLOTTE after the successful application for the Modellregionen Elektromobilität call. Another interesting aspect is that Vorarlberg was not perceived as a frontrunner for e-mobility. Preferred regions were the states where the automotive industry is located, such as Upper Austria and Styria.[15] However, the application of VLOTTE was the most convincing. On one side, this was due to the strong commitment of vkw in general, as not just one department wanted to conduct the project, but the executive board backed the endeavour. Additionally, even though no serial models existed, the project managers decided to travel to Norway to buy the four last available TH!INK e-vehicles.[16] To be able to import these vehicles to Austria, 10.000 pages of documentation and expert reports needed to be produced (vkw 2016).[17] The early e-vehicles were actually transformed combustion vehicles. Serial charging points did not exist, so vkw had to develop these.[18] E-mobility was not a completely new field to for vkw, however. At the end of the 1990s, vkw already had the idea to introduce e-vehicles in Vorarlberg. Back then, cars from a French manufacturer were used, which had lead-acid batteries. Vkw installed ten charging points in the public, so there has been some experience VLOTTE could build on. Additionally, two employees who were involved in the first e-mobility undertaking, were still working for vkw and could therefore contribute with their expertise. There were also about 50 to 60 e-vehicles already on the streets of Vorarlberg.[19] The e-vehicle portfolio was refined throughout the years. In 2010, the first serial models i-MiEV, C-Zero and ion from Mitsubishi became available (ibid.).

[14] INT-2 2016.
[15] Ibid.
[16] INT-5 2017.
[17] Ibid.
[18] INT-2 2016.
[19] INT-4 2016.

When the VLOTTE project was over in 2012, the people responsible did not want to continue with a third project. The reason was not dissatisfaction, but the offer to participate in two EU-projects. According to one interviewee, VLOTTE attracted partners from other countries due to the successful two project phases. The EU-projects were therefore following projects of VLOTTE. One project was called AlpStore, with the focus of storing energy in the alps and the other was called ELMOS – Electro Mobility Solutions for Cities and Regions, where the idea was to bring e-mobility solutions to other regions and to share knowledge, so mistakes were not made twice. The focus was on transferring lessons learned and to establish networks. One result was the Mobilitätszentrale[20], which is still the knowledge hub of VLOTTE today.

4.4.2 DIFFERENT PHASES OF VLOTTE

Phase 1 centred on the technical aspects of e-mobility, the charging and the battery and the vehicles themselves. This phase consisted of VLOTTE and VLOTTE II.

VLOTTE ran from 2008 to 2011 and had a funding sum of 4.7 million euros (Günther 2014). The initial product was the Mobilitätskarte (mobility card) which let customers use e-mobility for a monthly fee. The Mobilitätskarte cost roughly 500€ and covered the rent for the e-car, refuelling, maintenance costs and an annual ticket for the Verkehrsverbund Vorarlberg (linked transport system around Vorarlberg) (Klima- und Energiefonds 2015, p. 51). In the early days, VLOTTE aimed at 40% public institutions, 40% companies and 20% private people. In 2011 different models were added to the portfolio and consequently more private people were attracted (vkw 2016, p. 3). At the end of the project phase, 357 vehicles were on the streets. 143 private customers, 160 company vehicles and 54 in public institutions and municipalities. Three fast chargers were installed, 122 charging points in the public and 40 charging points that are semi-public (vkw 2013; Klima- und Energiefonds 2015). After the five-year phase, participators could buy the e-vehicle, which employees of vkw hardly did. The expert said that while the project was running, about 30 to 40 e-vehicles were parked in the parking area of vkw. Today (2016), there are roughly ten e-vehicles parked.[21]

VLOTTE was followed by **VLOTTE II** (2010-2012) (Günther 2014), in which e-stations with e-bikes, e-scooters and e-vehicles were built. The aim was to bring people in touch with e-mobility

[20] INT-2 2016.
[21] INT-1 2016.

and eliminate prejudices. However, the demand did not meet the expectations of the project team and it was stopped. They claimed to use these experiences for future projects (vkw 2013).

Phase 2 centred on the European level of e-mobility. Here, European networks were established and the Mobilitätszentrale developed. This phase covered the time from 2012 until 2014.

VLOTTE EMOTIONS or **VLOTTE III** (2012-2014, 251.000€) (Günther 2014) had three modules that colluded with each other. There is the Mobilitätszentrale, that is supposed to connect e-mobility customers with automobile dealers. The aim is to offer a low-threshold opportunity for potential customers to get in touch with e-mobility. When events are happening, automobile dealers can use the Mobilitätszentrale as a platform to present e-vehicles and themselves. The Mobilitätszentrale is located on the premises of vkw in Bregenz. Customers can get information on the website, but can also call and ask for advice. On-site consultation is another option, and it is also possible to go on test drives with different vehicle models up to three times per year. For this a Mobilitätskarte[22] is necessary, which costs 5€. The second module is the dissemination of user experiences. This is a measure to counter negative press with actual experiences from the project. In the project report the negative press is depicted as leaving facts out and being one-sided. Worries were that the public and politics could be negatively influenced. To work against these potential ramifications, events were hosted with the target audience being citizens, politics, media, companies, stakeholders, science and research. One such event was evolution:m that was organised 2014 in Bregenz. The third module was an effectiveness analysis as a decision guide for politics and companies (vkw 2016).

With **VLOTTE MEET&CHARGE (VLOTTE IV)** (2013-2014, 114.000€) (Günther 2014) the rural area of Vorarlberg is being provided with charging infrastructure. Especially tourist destinations were of interest to foster travelling with e-mobility. Restaurants and hotels offer charging stations for their guests, so charging can take place while people are dining or staying overnight (Klima- und Energiefonds 2015, p. 23). The target regions were the Klima- und Energiemodell-Regionen Lech-Warth and Leiblachtal. Funded e-vehicle parking was installed by vkw in cooperation with hotels and restaurants. The beginning of the project was promising and therefore the product was offered in all of Vorarlberg (Hirschbichler 2017).

[22] Not to be mistaken with the Mobilitätskarte from the project phase.

Phase 3 started in 2014 and marks the transition of VLOTTE from a project-oriented to a product developing operation. For this, a product manager for e-mobility was hired, who studies the market and develops products for customers, often in cooperation with the customer.[23]

e-Gastro (2015-2016)

After the success of VLOTTE Meet&Charge, the significance of e-mobility and tourism was recognised. Possible applications were e-carsharing for guests, e-shuttles for guests and the usage of e-mobility for hotel and restaurant matters. Hotels and restaurants were also perceived as multiplicators. The aim of eGastro was the development of a web-based decision guidance with personal contact for hotels and restaurants, since the target audience had voiced that they do not feel properly informed. Three different products were offered: test e-vehicles, GPS-trackers to document your own driving behaviour and to identify potentials for e-mobility, consultations with full-service package that consists of which e-vehicles suit the company's needs, economic calculations and potential solutions for using company vehicles for private needs. 37 businesses took the offer, of which mostly tried package 1 and/or 3. The GPS-tracker was only chosen by six businesses (Herry Consult 2016).

VLOTTE 2.00 (2016-2017)

In this project vkw offered KLIEN to find 125 private people who wanted to purchase an e-vehicle in 2016, with 4000€ funding from KLIEN. The funding sum was in total 500.000€ and in November 2016 (at the time of the interview), 112 people have been found. The interviewee predicted that the whole funding sum will be given away by Christmas.[24]

VLOTT im WALGAU (2018-2019)

With this project vkw wants to push e-mobility in the region Walgau. The target audience is companies, employees and people living in the region. The measures are to increase the amount of e-vehicles, extend the charging infrastructure, raise consciousness among companies, employees and people of the region, transform conventional fleets to e-mobility fleets and support commuters who would like to switch to e-mobility (vkw 2019b).

[23] INT-2 2016.
[24] INT-4 2016.

	Phase	Target Audience	Measures
VLOTTE	Phase 1, 2008-2011	40% public institutions, 40% companies, 20% private people	4.7 million euros, Mobilitätskarte
VLOTTE II	Phase 1, 2010-2012	Public at large	Installation of e-stations
VLOTTE III	Phase 2, 2012-2014	Public, politics, companies	251.000€, Mobilitätszentrale, dissemination, effectiveness analysis
VLOTTE IV	Phase 2, 2013-2014	Tourist destinations, restaurants and hotels, rural Vorarlberg	114.000€, consultation, installation of hardware, disclosure of new charging station in various media
e-Gastro	Phase 3, 2015-2016	Hotels and restaurants	Test drive, GPS-tracker, consultation
VLOTTE 2.00	Phase 3, 2016-2017	125 private people	500.000€ total 4000€/ person, funding of e-vehicles
VLOTT im WALGAU	Phase 3, 2018-2019	Companies, employees and people in Vorarlberg	Increasement of e-vehicles, extension of charging infrastructure, raising of consciousness

Table I: The different phases of VLOTTE.

4.5 SUMMARY

In this chapter contextual knowledge on Austria and Vorarlberg was presented. The geography of the country and the region was described, statistics of the population and economy were given as well as a brief description of the political system. In Austria the responsibility is divided between the federal government and the state government. The states are foremost responsible for energy supply, the federal state for taxation and statistics. The Austrian energy strategy has a strong focus on renewable energy. Short descriptions of the Austrian energy strategy between the years 2009 to 2018 were given. In Austria the goals are followed by the goals of the European Union and mainly centre on renewable energy and the reduction of emissions. Energy efficiency measures are crucial for Austria, as energy dependency is rather high in the country. On top of

the energy strategy, there is also an energy research and innovation strategy. The current government has been criticised for their lack of efficient measures by environmental groups. However, there are plans for decarbonisation by 2050 and planning and funding of sustainable mobility.

Austria's emissions goals have not been achieved in 2017. The Umweltbundesamt claims that major mobility changes are needed. Decarbonisation of the transport sector is one favoured way. E-mobility became a topic of interest in 2009. Within seven years the technology has matured, but societal acceptance was still lacking. The Klima- und Energiefonds is a funding organisation of the government, which has been initiating different e-mobility projects since 2008. In 2018 the target group has shifted from companies to individuals, which can be interpreted as a reaction of mainstreaming of e-mobility. The current government is pro e-mobility and has announced their program "#mission2030 E-Mobilitätsoffensive" for 2019 and 2020. The charging infrastructure does exist, but the deficiency of standardisation is problematic.

Even though Vorarlberg is claimed to be different to the rest of Austria, the so-called Vorarlbergian distinct characteristic is more of a political invention than an actual fact. Therefore, the perspective of the experts on Vorarlberg will be analysed in the next chapter, but political ideals were not investigated further in this chapter. Nevertheless, it is the case that in Vorarlberg involvement of citizens is widely practiced.
Vorarlberg set the target of covering the energy demand with only renewable energy by 2050 with the *Energieautonomie*. To achieve this goal, *101 enkeltaugliche Maßnahmen* were formulated, which can be translated as measures to reach the goal of the *Energieautonomie*. Here the 20-20-20 goals of the European Union were taken as an orientation. In addition to the energy strategy, Vorarlberg also has an e-mobility strategy, which is based on the concept of the Modellregion Elektromobilität. Involvement of citizens is a key characteristic of both strategies.

Furthermore, a short description of the illwerke vkw group, which is owned by the state Vorarlberg, and their corporate identity was given, the Modellregion Elektromobilität VLOTTE, its history and different phases described.

5. VLOTTE – WHY DOES IT WORK?

In the following chapters the empirical data of the 15 interviews is analysed within the theoretical framework. The perspectives of the interviewed experts and consumers are a recurrent theme in all chapters, but the experts' personal perspectives on the success of VLOTTE is portrayed in *5.1 The Transition Experts*. Their personal assessment stands in the tradition of Laura Nader's research on energy experts. VLOTTE is defined as a technological zone in which e-mobility is wider diffused and a supporting network has been created. The creation of a technological zone relies on a strategy, which is explained with the concept of the Strategic Niche Management, collective learning and building of trust. The spatial location of VLOTTE plays an important role, which is analysed in chapter *5.4 Sustainable Vorarlberg*. To foster the arguments, three examples are made use of in the analysis.

5.1 THE TRANSITION EXPERTS

> "It is appropriate that a reinvented anthropology should study powerful institutions and bureaucratic organizations [...], for such institutions and their network systems affect the lives of people that anthropologists have traditionally studied all around the world." (Nader 1972, p. 292f.).

At the end of the interviews the experts were asked how they define the success of VLOTTE and what has been learned. The responses were rather personal and give a small insight into how these experts 'think'. Their actions have an impact on society, but their actions also have an impact on the environment. With VLOTTE and vkw, the state Vorarlberg is actually accomplishing parts of the state's energy and e-mobility strategy. What should not be forgotten is these strategies are specified by goals of the European Union. Vkw has a role-model function according to one expert. Therefore, the high acceptance rates among the employees are appraised positively. The decarbonisation of the transport system is a very important topic and therefore it is on vkw to progress.[25]

Many essential steps were taken in VLOTTE. This covers the period from the beginning until today. In the beginning, the implementation of e-mobility was very difficult. There were no charging stations and there were no e-vehicles. The people who initiated the project were pioneers. These were people who were really interested in e-mobility and wanted to make a difference. Today, e-mobility has reached the mainstream society. One of the interviewed experts said

[25] INT-7 2017.

that he had visited the Vienna Autoshow the previous weekend and most of the people gathered around the Tesla booth. In his opinion e-mobility has reached the people at least conceptually. It is not a topic of ecologically conscious people anymore, but has reached mainstream society. Barriers to a wider diffusion are, among others, still to be found with the costs, but ordinary people are familiar with e-mobility now.[26]

The team was ahead of their time and this becomes apparent in another expert's statement. To him the greatest success is the far-reaching change of heart in Vorarlberg. In the first three years vkw was sneered and laughed at for their idea, some people even scolded them, but in the past two to three years (2013-2016) this has changed completely. The expert states, that in whole Vorarlberg one will hardly find anyone who does not perceive e-mobility positively. This change has happened in the population, the politics, the trade as well as the industry. This success can be accredited to vkw and that they "have done their homework". Compared to the rest of Austria, Vorarlberg has double the amount of newly registered e-vehicles. Today, politics and companies are more than willing to cooperate, which is a radical change to their attitude a few years ago.[27]

One expert has a rather pragmatic point of view. On the question what his experiences are with e-mobility he stated:[28]

> "Yeah, fine. Electromobility is no science. It's just easy to get in and drive. Well, it works. I've once read in an online forum where someone said that he always checks the phases before he plugs in his vehicle for charging. Will he kindly stop checking my phases! He should plug in his car and then drive again. It's no rocket science. You get in, drive and come back again. This is what we want. We want to build the network in such a way that we don't need five cables, six adapters, fifteen cards and no idea what, the key and a phase tester! E-mobility is easier than driving a gasoline car. People shouldn't have to deal with that. They should drive a car, plug it in, go shopping and then drive away again. No more and no less. And, of course, we want money for the services."[29]

In this expert's opinion the development status of e-mobility is not comparable to the early days. The people should just use e-mobility like any other mainstream technology. The goal of the e-mobility team is to make the use of e-mobility as easy as possible, which is already the case. Even

[26] INT-6 2017.
[27] INT-4 2016.
[28] As the interviews were conducted in German, all statements in this thesis had to be translated by the author.
[29] INT-10 2017.

though it still needs to be further developed, there is no need to worry or to have specific knowledge to use it.

Another expert is already giving an outline of what will be next. He sees a purpose in what has been learned and that these learning outcomes need to merge into future projects and developments. He describes what kind of problems might occur when a customer is generating their own electricity with a PV system. This solution is currently applied in vkw's own car park. By applying it in vkw's everyday context, problems can be figured out and solutions can be found. Storing the electricity in a stationary battery is not common yet, but is already quite significant and customers have expressed their interest in the technology. Therefore vkw is running projects for future solutions.

> "It has to go on. Quite purposefully. We also want it to go on, because I say this was only the beginning. Our vehicles must always be loaded. They don't want to have a problem there. That's logical. Now during the day the PV delivers efficiently, there is never a problem. But what about bad weather? Winter? All these topics. At the same time we just want to work on it. What if it progresses further? Costs are relevant. We already have noted that we currently are producing unnecessary peaks. If there is a peak once a month, you will pay the whole month for this peak. That's just the way it is. This is really unpleasant. If there are customers outside, at some point they will say, is there no solution? This will be the next topic. With stationary batteries we want to cut the peaks."[30]

Generally speaking, the experts think that they have been, and still are, part of a major transition process. E-mobility was very experimental in the beginning, technical solutions had to be invented and these experts helped to diffuse the technology and worked hard on winning people in Vorarlberg over. After these first ten years, they look back and acknowledge what they have contributed to, but they also are not done yet. Mainstreaming e-mobility is a whole new level and they are now preparing solutions for the next ten years to come. The question is, how has e-mobility reached this level of awareness in Vorarlberg? Therefore, the management of the transition is being explained in the following chapter.

[30] INT-11 2017.

5.2 MANAGEMENT OF THE TRANSITION

The energy and e-mobility strategies of Vorarlberg are strategic development proposals. The decarbonisation of the transport sector does not just happen, but was and still is a strategic endeavour of different actors. Strategic Niche Management is a useful approach for analysing the introduction of new technologies. This approach will be used in combination with the statements of the experts and users to explain vkw's strategy. The focus of Strategic Niche Management is on

> "*what has been learned* (and not been learned) thanks to the experiment, and to what extent did the experiment lead to *institutional embedding* in the form of the creation of new networks, public acceptance, and strategies and actions of private and public actors to further the wider use and development of the technology experimented with." (Hoogma et al. 2017, p. 182).[31]

A niche differs "in some respects [...] from those defined by the technological regime." (ibid. p. 180). In this case the technological regime is the carbon-intensive transport sector. The Klima- und Energiefonds with vkw and the state Vorarlberg have created a niche with the Modellregion Elektromobilität VLOTTE. This niche is governed by the different actors, but "there are [also] changed cost and demand conditions." (ibid.). E-vehicles were not available as serial models in 2009, so vkw let manufacturers build e-vehicles. Charging infrastructure was not available, so vkw installed public charging points. A "technological fix" (ibid. p. 1) is, however, not the sole way to a transition. A change in means of transport is one way of decarbonising the transport sector, but technical change only will not solve climate change. A change in mobility behaviour has been called for by the Austrian government and vkw, but it is also a claim of transition niche management (ibid. p. 181). Hoogma et al. propose to experiment with "real users" (ibid.). This has been done in VLOTTE. Firstly, VLOTTE is a pilot and demonstration project, as has been explained in *3.1 Case Selection and Collection of Data*. Secondly users have been central and were coming from inside and outside of vkw. The successful diffusion of a technology is determined by different factors, which have been defined in Strategic Niche Management. These are crucial for "a shift to more sustainable transport technologies." (ibid. p. 12). Furthermore, the mobility department of vkw is actively involving their employees in the transition by talking to them about their mobility behaviour and encouraging them to use sustainable transport means. Especially new employees are addressed as their way of commute to work is still flexible.

[31] Emphasis in the original.

"**Technological factors**": "One important barrier to the introduction and use of new technology is that new technologies often do not fit well into existing transportation systems." (ibid. p. 13). This barrier was taken care of already with the binding conditions of the program Modellregionen Elektromobilität. Vkw had to build new infrastructure and the electricity had to come from newly established sustainable power plants, such as hydroelectric or photovoltaics plants. In addition, batteries were rather expensive in 2009 so a battery insurance model was developed in cooperation with the Vorarlberger Landes-Versicherung V.a.G. The risk was rather on the project initiators than on the users with leasing models and the option to buy the e-vehicle after the project, which was not compulsory.

"**Government policy and regulatory framework**": "Even though governments are committed to environmental protection and other social goals, often they are not putting out a clear message that there is a need for specific new technologies." (ibid.). This barrier has been dealt with on a federal level with the program Modellregionen Elektromobilität. KLIEN funded the region, but also smaller projects later on. On a state level non-material support in forms of strategies, decisions and legislation was foremost. One expert commented this with:

> "The state of Vorarlberg has never promoted e-mobility from 2009 until now (2016). To the extent that one can say one supports anyone on the subject of e-vehicle purchase. One exception was that seven e-vehicles were funded. These are vehicles of public interest, such as meals on wheels, mobile emergency services etc. But otherwise the state Vorarlberg has always held back on the topic of subsidies."[32]

So, subsidies fall into the responsibility of the federal state, but it was the state of Vorarlberg that commissioned vkw to lead the Modellregion Elektromobilität VLOTTE.
There is still a long way to go. Apparently, driving schools and the legislation of driver's licences is an issue. If people take their driving lessons in an e-vehicle, they will only be allowed to drive automatic cars. This means driving schools have no interest in buying e-vehicles, since there is no demand from driving students.[33] This is an issue that will be dealt with in the future.

"**Cultural and psychological factors**": For many automobile users, owning and driving a car is a way of expressing individual and societal identity: the car is a status symbol." (ibid. p. 14). On one side this problem is taken care of by implementing e-mobility in companies. During the project phase, individuals were addressed, but these were only 400 people. These 400 people

[32] INT-4 2016.
[33] INT-5 2017.

were early-adopters, who were actually interested in the technology. By introducing e-mobility through the work context, ordinary people get to try e-vehicles and can work on overcoming their fears and prejudices. The significance of getting in touch with a new technology is illustrated in the chapter *5.4.1 Use Case*. The employees of the company were spending a considerable amount of time on the question if an e-vehicle is a "real vehicle" or just "pressed tin". This has also been highlighted by an expert of vkw, who said that they had to call many employees in the early days of their fleet transition to convince them of the benefits of an e-vehicle. When an employee booked a fleet vehicle via the online system, they also had to state the destination. If the destination was only 50 km or less from vkw, the employee was called and informed on the possibility to book an e-vehicle. These fears have now passed, according to the expert, as the employees report positively on their e-mobility experiences.[34]

"**Demand factors**": On the user side, demand factors can be "preferences, risk aversion and willingness to pay" as the technology has "not yet proved" its "value". Range anxiety can block the demand as it can have an impact on the user's practices, but also auto dealers can block sales (ibid.). Vkw has dealt with these issues by using e-mobility in the work context. Distances taken in these companies are comparably short, costs are taken care of by the company and the value of the e-vehicle can be experienced by daily practice. However, as the Use Case will show, changes in daily practice can have a rather large impact and it is up to the user how open they are to practice changes. In this stage of the technology development a wider diffusion is possible, but mainstreaming is unlikely as the technology and the economic conditions still need to be worked on. Therefore, e-mobility is suitable for businesses, but will not substitute combustion vehicles of private people any time soon. This has been highlighted by one expert. Private people tend to not think in total cost of ownership. The only focus is on the investment costs without calculating what a vehicle will cost the owner over the years. Here, he sees a difference to fleet operators who calculate the cost for the lifetime of a vehicle. This is a crucial point where still much educational work needs to be carried out. Government funding can help with this barrier, but still needs to be communicated accordingly. One part of educational work is also letting people try out e-mobility by providing test drives. People want to try out a new technology and, according to him, people are satisfied with the product after having driven an e-vehicle. To his surprise e-carsharing is successful in regions all around Austria. One explanation is that it gives people the opportunity to drive an e-vehicle for a limited time and let them make their own

[34] INT-7 2017.

decisions. The sustainability aspect in particular brings people to e-mobility, owning as well as being part of a carsharing initiative.[35]

This impression is supported by another interviewee, who sees the reason for the success of e-mobility in Norway mainly in the price policy. He refers to a presentation of Ole Henrik Hannisdahl of the company Grønn Bil (green car), who was invited by VLOTTE to speak at an event. Hannisdahl said that Norwegians are not necessarily 'greener' than other people, but e-vehicles are reasonably cheaper than combustion vehicles. A Vorarlbergian way of overcoming this barrier is the *Energieautonomie* of which the E-Mobilitätstrategie is a significant part. If the state was not as supportive, vkw would not have been involved in e-mobility. However, nowadays (late 2016) the interviewee has noticed that customers become more and more interested in the topic by their own accord. "Politics set the basic conditions and the customer can either calculate or he finds the topic in itself already great and drives the whole thing also naturally forward."[36]

This perspective is not necessarily shared by everyone. One user who participated in the VLOTTE project from the beginning explains his reasons for returning the e-vehicle after the project instead of buying it. "I thought about it, but it is too expensive for me at the moment and the range is too little. I currently have a gas vehicle, but if that is nothing more, I'm sure I will switch back to e-mobility. I'm really enthusiastic about the driver comfort, but as I said, it's simply too expensive."[37]

"**Production factors**": "There are also barriers on the supply side. The development from prototype to mass product is lengthy and cumbersome, but above all risky." (ibid. p. 15). This was an issue in 2009 and vkw went a long way to bring the first e-vehicles to Austria. Automobile manufacturers have caught up in the meantime, but this is nothing vkw can control. However, vkw involves auto dealers into their network by visiting them regularly.

"**Infrastructure and maintenance**": "The introduction of new technologies may also require adaptation of infrastructure. New distribution systems may have to be established [...] or social provisions may need to be made." (ibid. p. 16f.). Vkw owns the public charging stations and also deals with their maintenance. Other maintenance tasks, such as installation of wallboxes or the like, are taken care of by external partners. Vkw has established a wide-reaching network and steers their customers to partners, when being asked for recommendations. This is done through the Mobilitätszentrale, which is the central knowledge hub for e-mobility in Vorarlberg.

[35] INT-1 2016.
[36] INT-2 2016.
[37] INT-15 2017.

"**Undesirable societal and environmental effects of new technologies**": These can be battery waste issues or image problems of a new technology. Hoogma et al. propose the traditional way of dealing with these issues through policies and further research. Vkw is continuously researching their products, establishing show cases and co-operating with other actors, also from the state. In the interviews the experts were quite frank about issues, such as that the current solutions will probably not be working in the future. However, they were also quite determined to work on these issues, foremost because it is their daily business. They keep in touch with their customers and stress the importance of feedback. Vkw is also growing through their customers, as is shown with the Use Case. The expert said that he would not have imagined such a solution before the customer commissioned vkw to build a fast charger on the customer's ground and the customer is renting the charger from vkw. By being open to alternative routes, societal and environmental effects can be controlled.

As learning is a central theme in pilot and demonstration projects, what has been learned will be analysed in the following chapter.

5.3 COLLECTIVE LEARNING

Sahakian and Wilhite propose that learning "will be more meaningful to people the closer it gets to specific social practices, set in tight space and time continuities." (Sahakian & Wilhite 2014, p. 31). How this collective learning in a business context has been approached in VLOTTE is explained in this chapter. Learning refers here to what the team of VLOTTE has learned, how learning has been steered, but also what users have learned.

First of all, there is a great engagement in vkw to work on the mobility behaviour of their employees. New employees get asked about their mobility behaviour. Vkw promotes sustainable transport, offers bicycles and wants employees to use public transport. The expert perceives this as a great approach and a great way of welcoming new employees.

> "And that's a really great thing, when you start over here, when you're immediately steered into the right direction. It is a completely different situation than when a certain behaviour has crept into your daily life. When you're used to always coming by car, it is much more difficult to switch to public transport or bicycles afterwards. When you simply try it, you will find out that it works quite well. We are active in this direction and

> see it as a great thing. Basically, it is a matter close to the heart, to create awareness among the employees."[38]

This is not the only way how change is slowly introduced into the daily practices of employees. When an employee books a vehicle of the fleet and someone else has booked a vehicle to the same destination around the same time, the employee gets notified and asked if they would like to pool their ride. This option is generally available so employees can always share one vehicle.[39]

Awareness and community are part of the whole learning initiative, which has been crucial in vkw's transition process from the beginning, as has been stated by an expert. When the fleet of vkw was turned into an e-fleet, educational work was one of the central measures to convince people of e-mobility. In the beginning of the transition, people could choose a vehicle of the pool and if a combustion vehicle was chosen for a short distance, the mobility department called the employee. Now, when employees book a vehicle through the booking system, the e-mobility option is default. If an employee needs to travel further or needs a specific vehicle that is not electric, they need to change the default setting. Of 60 pool-vehicles at two locations, 18 vehicles are electric and available in the car pool. There are more electric vehicles as part of vkw's fleet, but these are assigned to specific people. According to the expert, the booking of e-vehicles is comparable with the booking of standard vehicles. The expert recognizes full acceptance among the personnel here.[40] This argument is confirmed by the statement of a user. In his experience, his colleagues only report of positive experiences with e-mobility. The user states that e-mobility is comfortable and his colleagues are absolutely delighted by the technology. In his impression, this is due to the easy access to e-vehicles in the company. Employees got to try e-mobility and have realised that it works.[41] The role of multiplicators may not be underestimated. As people report of their experiences, they might convince other people to try the new technology or stick to the well-known technology. For the diffusion of a new technology multiplicators are necessary. If people do not hear about the daily suitability and do not get in touch with people who already use the technology, they will be less likely to buy the technology.[42] Companies with e-fleets function as multipliers as they bring their employees in touch with e-mobility and can therefore test drive over a longer period.

[38] INT-7 2017.
[39] Ibid.
[40] Ibid.
[41] INT-8 2017.
[42] INT-5 2017.

So, even though driving an e-vehicle might be going well for most people, charging infrastructure has been a significant aspect. This is one important learning outcome of the VLOTTE team. Several experts stated that it is questionable if every small village needs a public charging station, as most of the charging is either done at home during the night or in the midmorning at work. When longer distances are driven with an e-vehicle, it is important that people have fast charging options along the way. Long distance travel is already quite time consuming and a consumer does not want to spend a longer time at charging stations along the motorway. Charging on the go happens rarely, but if no public fast charging infrastructure exists, people are faced with their range anxiety.[43] So, they are differentiating between e-mobility being applied in the daily life and e-mobility for leisure and travelling. This is of interest to Vorarlberg as it is a popular tourist destination.

Charging at home might not be difficult if a wallbox needs to be installed in a private house. However, it is rather difficult in a multiple-dwelling unit. One of the experts has told the researchers about a personal experience, which has also been experienced by other people. Apparently, if one other person in a multiple-dwelling unit opposes the installation of a wallbox, nothing can be done. This has led vkw to develop a new product and also cooperate with building developers to prepare buildings for e-mobility, by at least leaving the opportunity open to install a wallbox later on. Often, if there are several carports in the basement, cables need to be dragged over several parking spots, which is expensive on one hand and might not be appreciated by neighbours on the other hand.[44] This point is also mentioned as a measure in Vorarlberg's e-mobility strategy (Amt der Vorarlberger Landesregierung 2015). The interviewee does not see this as a problem of the building developers right now, but predicts that it will become an issue when e-mobility is becoming more popular in the next five years. He also stated that there are already e-mobility enthusiasts who reject apartments if a charging infrastructure is not present or cannot be installed. Costs are generally a major problem as retrofitting is too expensive. Plus, maybe one, two or three wallboxes will not strain the grid too much, but several more cannot be tolerated by the grid and an informal installation of cables is not desirable.[45]

[43] Ibid.
[44] INT-2 2016.
[45] INT-2 2016.

Overall, the experts of vkw have stated that e-mobility is a permanent learning process. The range has been extended, the performance has changed and everything is getting easier. With the current e-vehicles everything is very easy,[46] but there is still a long way to go.

5.3.1 BUILDING OF TRUST

Collective learning is important, but learning does not work if there is no basis of trust. Vkw has invested much time, money and energy into building a relationship with their customers. By building trust in the community, vkw was able to build the brand VLOTTE. This can definitely be ascribed to the institutional embedding of illwerke vkw, but it is also sign of authenticity and reliability. How this authenticity has been created will be traced back by analysing expert and user statements.

It all started with the project VLOTTE. An expert who is not part of vkw said that unsatisfied or unhappy customers were treated with an all-round carefree package. The technology was not just brought to the people and then observed what the users do with it. The people were actually accompanied. They needed to be addressed and animated, so experiences can be exchanged and the actors receive feedback. When solutions are provided quickly, frustration on the user side can be avoided. The expert sees the all-round carefree package and the involvement of the users into the project as key for the success of VLOTTE. However, this kind of care needs resources, which cannot be provided during regular business times. This is a luxury that is only available during project phases.[47] This is an observation the expert has also made in other pilot and demonstration projects outside of Vorarlberg. Other interviewees have confirmed this observation. The significance of the customer was particularly highlighted in several interviews. Besides establishing infrastructure, building new renewable energy sources and bringing e-vehicles on the streets of Vorarlberg, the customers in particular were a main focus from the beginning on. Customers were involved in the project plans, they were consulted when it came to where to install charging points and where to build photovoltaic systems.[48] Today they are involved in developing new products and make it possible for vkw to develop products the team would not have thought about otherwise.

[46] INT-7 2017.
[47] INT-6 2017.
[48] INT-2 2016.

What helped as well was the involvement of the employees. In the beginning of VLOTTE the call was open not only to people outside of vkw, but employees could also participate. The expert's impression after the five-year phase is that especially range anxiety is not of concern anymore. In his team several colleagues participated and after returning their first vehicles, they ordered new ones.[49] Other departments within vkw are also customers of vkw. The mobility department commissioned vkw to develop a solution for the e-vehicle fleet. The case is described and analysed in detail in the MATCH deliverables D2.1 and D3.1 (Ornetzeder, Sinozic, Gutting & Bettin 2017; Ornetzeder et al. 2018).

Nevertheless, interacting with ordinary people comes with new challenges, as has been stated by a team member. Educational work is not only done for the public, but the e-mobility team is also learning in the process of the third phase. In the first two phases the team mainly interacted with technicians and communication was easy, as they all spoke the same 'language'. Now, with the transition to the market phase, a wider audience is reached and marketing and the language need to be adapted accordingly.[50] These learning outcomes will be important for future work of the team members. The people involved in the e-mobility department are described by one interviewee as experts on the topic. He is certain that nobody can actually grasp the wider consequences of the transition. Not only are the automobile manufacturers affected, but also the supply industry, and the energy providers. When he started in 2012, no one could have imagined the status quo of the year 2016. According to him, the whole process happened very quickly and he predicts it to accelerate even more, especially because the political support is crucial and the automotive industry is producing serial models. This is a fundamental challenge for the energy providers, as they will have to provide the infrastructure. He does not perceive this as a threat, but as an opportunity. Vkw already has the knowledge at their disposal. He stresses that besides their normal dedication to work, they are all very much privately interested in e-mobility. He describes this as a major benefit, since being a user himself, he will always double-check if the developed product is something he would use. This is only possible, as vkw is giving their employees enough space to work creatively.[51] So there is trust on the customer side, but there is also trust within vkw. From early on, the state of Vorarlberg has trusted vkw to embark on this experimental endeavour, but there was also trust from the management of vkw and there is trust among the VLOTTE team members.

[49] INT-1 2016.
[50] INT-2 2016.
[51] Ibid.

This trust can also be perceived in vkw's network. Having a network helps with trustworthiness in the public. It was stated that customers have called to ask for a recommendation for an electrician. Charging infrastructure is not installed by vkw, as the grid is the responsibility of Vorarlberg Netz. This has caused some confusion when customers needed assistance but did not know where to turn to. Before being able to charge an e-vehicle and install a wallbox, the grid operator needs to be contacted.[52] By knowing who is the right contact person and ideally being able to recommend an electrician who knows what they are doing, VLOTTE is perceived as trustworthy instead of just promoting e-mobility without further assistance in the transition to it.

The most important tool for establishing trust is the social aspect of the Mobilitätszentrale. On one side it is used as a consulting service and a meeting place for events. On the other hand, auto dealers can display their vehicles in the Mobilitätszentrale. One interviewee highlighted that the local auto dealers are very important and that they need to understand why e-mobility makes sense in Vorarlberg. The salespeople are visited by the VLOTTE team and are invited to events. One significant event was the first e-mobility day in October 2016, where they were able to display their vehicles, offer consulting to interested people and test drives. Nevertheless, auto dealers are not perceived as "friends" of VLOTTE. They cooperate with the team and have been involved from early on, but are not the greatest supporters. Not being on cordial terms does not necessarily mean they are opponents, as they still work with VLOTTE.[53] State politics have been the first supporter, electricians are also on board, but are not e-mobility enthusiasts.[54] This has become clear during the interview, that grey colours are accepted, but being either for or against e-mobility is a crucial trait. It seems as if in this phase the business is still vulnerable and the project team needs to know who they can count on. Building a network has been important already during the project application phase, but having supporters is still essential.

All this energy invested into the making of VLOTTE has been paying off. This is portrayed in the e-vehicle fleet of vkw's mobility department. The expert stated that currently (2017) it looks like the increase of vkw's fleet is going faster as previously expected. The e-vehicles are very well accepted and it turned out in practice that 90% of the people that need a vehicle, manage with the e-vehicles. The expert states: "That's why I say I have the feeling that things are going faster than originally thought. So I assume that in five years the multi-storey car park will be very full

[52] INT-2 2016.
[53] Ibid.
[54] Ibid.

and that we will really have around 50 or 60 e-vehicles in it by then."[55] This is the result of establishing trust among the personnel, but also favourable developments on the e-mobility market.

The following show case is one example of a measure of trust and learning. It shows how vkw has built their own small-scale demonstration, which is being used as a proof of functionality for future products.

5.3.2 SHOW CASE I[56]

A comprehensive desire of some customers is autonomy from energy providers. The show case is the house of an employee, who generates his own electricity with a photovoltaics system. The system consists of a photovoltaics system, battery storage, e-vehicle and self-supply. At the time of the interview (2016) no products were on offer, but the interviewee stated that a pilot project has already been running since 2014 in the house of a vkw employee. If the tested solution became a commercial product, the main responsibility of energy providers would change dramatically. In the end energy providers will only have the choice between offering their own products and letting other companies dominate the market. The latter would be the least economic choice, as it would leave the energy providers with sustaining the grid and selling only so-called winter electricity (during the summer a PV can already generate a sufficient electricity supply). The pilot project is an internal project that is not funded externally. The reason that a vkw employee is participating in the study is that the installation is still rather experimental and the company did not want to involve ordinary people in this risky endeavour. An affinity for technology was a prerequisite as the solution was not mature.[57] The user reported that he thinks that the product is great. At the moment it is still too expensive to show profitability, but "there is simply an idealistic feeling, that I can say that I have actually produced the electricity for today or which I need per day, myself. And tonight I'm simply depriving the needed electricity out of the battery. That gives you a great feeling."[58] The interview with the employee who lives in the house was conducted in 2017. The test case that has started in 2014, has in the meantime been developed to a product. The product is distributed through a specifically established sub-company.[59]

[55] INT-11 2017.
[56] A detailed analysis of the "smart energy trial household" can be found in the MATCH report D2.1.
[57] INT-2 2016.
[58] INT-15 2017.
[59] INT-15 2017.

In the following chapter the green and sustainable image of vkw is analysed. Sustainability and a close connection to nature and the environment has been mentioned by several interviewees. It is also a prominent characteristic of illwerke vkw, as has been highlighted in chapter *4.3 Illwerke VKW*.

5.4 SUSTAINABLE VORARLBERG

Sustainability is an important topic in Austrian politics. The current ministry for environment is named Bundesministerium für Nachhaltigkeit und Tourismus (Ministry of Sustainability and Tourism) and main responsibilities are environment and water management, agriculture and rural development, forestry and sustainability, climate, waste management, chemicals policy and environmental technology, energy and mining, tourism and regional policy (Federal Ministry for Sustainability and Tourism 2019a). Austria builds its own strategy for sustainable development (ÖSTRAT – Nachaltigkeitsstrategie des Bundes und der Länder) on the sustainable development strategy of the European Union (Federal Ministry for Sustainability and Tourism 2019b). As the term sustainability is already part of the name of ministry, it is clear how important this field is. Sustainability does not just cover the environment, but also the social dimension. Therefore, sustainable Vorarlberg refers to the environment, but also to respecting the social and community.

The image of the green and sustainable Vorarlberg was a recurring theme in the interviews. Sustainability is also a dominant characteristic of the group illwerke vkw. It is questionable if Vorarlberg is greener than other states in Austria. It is more likely that sustainable Vorarlberg is a politically forced image for the popular tourism destination. The survey of Edwin Berndt (2003) on important symbols for Vorarlberg among Vorarlbergians showed that aspects such as the Lake Constance and the mountains were the most popular. However, these Vorarlbergians also named mountains and the Alps as the most important characteristics of Austria (Berndt 2003, pp. 8 & 13). Nevertheless, the interviewees see environment and nature as important and use these aspects partially as explanations for the success of VLOTTE. The size and the topography of Vorarlberg provide an advantageous geography for e-mobility. Vorarlberg is rather small and the population is limited to the Rhine Valley and the Walgau between Feldkirch and Bludenz,

where two thirds of the people live.[60] As Vorarlberg is a popular tourist destination, companies that have been using sustainability for their marketing, were rather open for e-mobility.[61]

The expert from the government institution sees one explanation for the success of VLOTTE in Vorarlberg as a general characteristic of the state. According to him, Vorarlberg is one of the leading states in Austria when it comes to sustainability and the field of environment, especially mobility wise. He describes the Vorarlbergians as down-to-earth and pragmatic and this is reflected in vkw. They did not have a big consortium, but just vkw. With the support from the executive board, decisions did not take as long as with other applicants. Vkw took the risk instead of spending too much time on calculating the risk. He admits that the TH!INK was not the best vehicle, but worth the experiences that were made.[62] He also states that the overall concept of VLOTTE was rather complex. First of all, they had started early before there was the e-mobility 'hype'. Then, in the rather small region it was not too difficult to diffuse the 400 e-vehicles. VLOTTE is an e-mobility product and the interviewee sees the development of the product as a system transformation. As vkw's initial target audience were companies, the risk was not on private people and companies calculate the costs differently. Today, VLOTTE is a brand that is well-known, also outside of Vorarlberg in Austria as well as in Europe.[63] This perspective is confirmed by one of the team members. He describes the structure as one with a low hierarchy. There are only short distances and good ideas are easily communicated internally at first and later on easily realisable. Additionally, the economic situation of the energy provider was very good and not much persuading had to be done. The mentality in the company is not too traditional, old habits do not need to be carried through and people are open to changes and new ideas.[64] This matches the opinion of one user. Relatively speaking, Vorarlberg has the highest density of e-vehicles in Austria and this is explained by one user as the result of having started early. VLOTTE was the first e-mobility region and therefore has an advantage that is not to be underestimated. Financial incentives are beneficial, but not crucial in this case, as they also exist in other states. Vkw carries out a great deal of consultation, is on hand with help and advice, and offers solutions.[65]

Sustainability might be of importance to the state and the company, but it is also used strategically. What started as a pilot project has in the last ten years been developed into a business

[60] INT-4 2016.
[61] Ibid.
[62] INT-5 2017.
[63] Ibid.
[64] INT-4 2016.
[65] INT-3 2016.

concept. Even though the name VLOTTE was originally just the project[66], it is now a brand. Over the years VLOTTE has built a reputation and people in Vorarlberg know what it is. Through this vkw has created a "property ownership" (Barry 2001, p. 50). E-mobility in Vorarlberg is now inseparable from VLOTTE and this has secured vkw "technological rights of access" (ibid.). This argument is being fostered by the ownership of charging stations in the region. Vkw runs and owns the majority of charging points and hardly has any competition. In one interview the term monopolist was dropped.[67] The size of Vorarlberg is also portrayed in the size of vkw. This image is confirmed by another expert. Vorarlberg is located in the three-country point of Switzerland, Austria and Germany. The expert is from Germany, but works in Vorarlberg. He states that when he speaks to people on the other side of the border, who do not work in the energy industry, that their perspective is very different to the Vorarlbergian one. One reason could be, he speculates, that combustion vehicles are tax-supported in Germany and therefore the enticement is lower.[68] This would support the initial argument of the sustainable politics of Vorarlberg and their e-mobility strategy, which stresses legislation. But it also fosters the argument that the brand VLOTTE has had an impact on people.

To trace the engagement of vkw back to a certain green image or characteristic is standing to reason, but this explanation overshadows further explanations. Vkw, as a government-owned company, acts on behalf of the state Vorarlberg. This has been stated by one interviewee as being supportive of political goals. Vkw wants to bring e-mobility to the people.[69] The execution of power is not centrally organised anymore, as it used to be. In today's society the state exerts its influence through different institutions (ibid. p. 62f.). This is also epitomised in the democratisation of the energy system. So far, energy distribution is centrally organised, the decentralisation of the grid also makes it more accessible to ordinary people and wider competition. Theoretically, everyone could generate electricity with a photovoltaics system on their roof. With the advancement of their portfolio, vkw is adapting to the upcoming market conditions. This also means that the state Vorarlberg as the owner of vkw is adjusting their execution of power. Vkw is planning to have one hundred e-vehicles as standard vehicles in five years. This means almost double the amount of the current number of e-vehicles in the fleet. This depends on the charging infrastructure, but also on employees. Some people have to travel further distances and work should not be negatively impacted. The expert states, that there are already employees willing

[66] INT-3 2016.
[67] Ibid.
[68] INT-1 2016.
[69] INT-7 2017.

to switch, as they think vkw should also be a pioneer in long-distance e-mobility. However, the economic aspect is equally important. The e-vehicles need to be economic in purchase and maintenance.[70] Sustainability shall not be reduced to being environmentally friendly, but it also comes with social responsibility. The early involvement of employees in the VLOTTE project, the inclusion of customers, and the low hierarchy has secured vkw a certain trustworthiness among the people in the state and in the company. This has helped to give vkw a certain standing and awareness, which is portrayed in their infrastructure planning. It is sustainable, but also strategic planning.

Figure IV: VLOTTE wallbox in front of a private house with solar panels on the roof. (Photo taken by the author, Eichenberg, June 2018.)

Several experts have mentioned that the most important aspect is that the customer has the opportunity to charge their e-vehicle at locations where it is parked for a longer time. This is either at home or at work. Public charging is nice to have, but nobody would purchase an e-

[70] INT-7 2017.

vehicle and rely on public charging. The climate goals of Austria are especially straining for the traffic sector. If a closer look is taken at the federal government's extrapolation of the numbers of e-vehicles in the future, it becomes apparent that many people will want to charge their e-vehicle at home. However, this topic has not been considered by public actors so far. The grids have not been built for this kind of electricity consumption, and the legal framework conditions do not consider charging infrastructure in multiple dwelling units. Energy and grid providers build grids with a focus on the next 100 years. Now, the whole order is in a state of flux. In the past three years the amount of licences of e-vehicles has doubled in comparison to the previous year and tripled in 2016. Vorarlberg plans to have 10.000 e-vehicles by 2020 and the system needs to be ready by then. The state of Vorarlberg and vkw are seen as e-mobility promotors and when the mass diffusion is actually happening, blockages due to minor issues cannot be happening. Some employers are already pro-active and want to provide this infrastructure for their employees, but there are also employers that do not care. Companies are key actors in this debate and planning for the future needs to be timely. Vkw's current solutions work now, but will not be applicable in five years. The future problems and obstacles cannot be imagined now. These will not only be of technological nature, but of various kinds. How fast or slow the transition will happen is of current concern.[71] This is why vkw invests so much in networking and smaller projects. Being present and being able to show applied solutions is a solid way to trust. How this is done can be explained with the use case.

5.4.1 USE CASE[72]

The use case stands exemplary for the third phase of VLOTTE and for the awareness of the importance of trustworthiness. A building company owner has decided to transform the company's fleet from a conventional one to an electric one. E-vehicles were leased for the construction managers and other employees, who use vehicles for their work. These are standard passenger e-vehicles, as at the time of the interview (2017) specific vehicles such as flatbed trucks were not available as an e-vehicle. The owner of the company, the manager responsible for the fleet and a construction manager as an e-vehicle user were interviewed. They told the researchers about the whole process from decision-making to implementation in daily work life.

In this case the relationship between the building company and vkw is built on a charging station solution for the building company. One of the experts of vkw explained how he perceived the whole process. He stated that if he would have been asked one year prior to the interview, if

[71] INT-4 2016.

[72] A detailed analysis of the "company e-fleet" can be found in the MATCH report D2.1.

such a product would have been part of VLOTTE's portfolio, he would have said no. This was nothing they would have thought of. At the beginning of 2016 the customer called VLOTTE and told them that he has bought ten VW e-Golfs, which will be delivered in six weeks. He wanted to know how he could charge these e-vehicles. The response was that the charging process with a wallbox takes between six and eight hours, which was too long in the customer's opinion. A faster option would be charging with a fast charger, which costs around 30.000€ and is too expensive in the customer's opinion. So, the customer commissioned vkw with the installation of the fast charger, but pays the company a monthly fee. The concept is called contracting and quite common, but until then no fast charging stations have been installed under these requirements.[73]

The business partnership between the two companies goes back to the VLOTTE project times. The company has also participated in the VLOTTE project. This was initiated by vkw, according to the interviewee. The complex where the company is located also hosts a supermarket, a clothing shop, two bakeries, a pharmacy and a health centre. This complex also belongs to the family of the building company owner and a regular public charging station was installed there years ago. In 2011, vkw approached the building company and asked, if they would like to participate in the VLOTTE project. After the project phase, the leased Mitsubishi iMiEV was bought, even though they were not too impressed with the vehicle. This decision was explained by the interviewee with the existing partnership with vkw. Since then the e-vehicle was part of the fleet, but only used as a spare vehicle.[74]

A fast charger is not necessarily the fastest charging solution for an e-vehicle. Different models show different charging behaviour. A Renault Zoe charges relatively fast (+/- 30 min) with a wallbox, but several hours with a fast charger. It is the opposite with a VW eGolf. The choice of e-vehicles was communal. The construction managers of the building company had two months to test drive different e-vehicles. During that time the management had leased different models, which were available to the group of employees, who would be using the e-vehicles in the future. After the two months they could fill in a questionnaire, state pros and cons and communicate clear visions. In the end, it was also a question of image. Even though Mercedes was liked, they did not want to come across as showy when visiting customers or driving to construction sites. "I don't think it would be wise, if all our technicians came along with a Mercedes,"[75] stated the

[73] INT-2 2016.
[74] INT-12 & INT-13 2017.
[75] Ibid.

owner of the company. Charging infrastructure was an important and also emotional topic. The fear of having a breakdown and not having any charging possibility was voiced several times. Due to this reason a fast charger was chosen.[76] A recurrent theme during the interviews was that e-vehicles are "real vehicles". This seemed to be an issue among the employees. The Mitsubishi iMiEV was described as "compressed tin" and nobody wanted to drive around with something similar to a toy vehicle. It needed to be a real, a full vehicle. Therefore, the opinion among the employees was divided and range anxiety was a central issue.

Several reasons for the transition were voiced by the owner. The political and tax conditions during the transition phase were ideal. Sustainability and environmental awareness have been something the company has been striving for a long time. He admits that it sounds controversial coming from a building company, but efforts have been made. The apprentices have planted trees, the company recycles natural resources, and they are eco-certified. It is a firm belief in the company that the topic of mobility needs to be solved differently. The customer partnership with vkw has existed for a long time and the development of solutions has come about. It was just the right time. However, without the fast charging station a transition would not have been of interest to the owner.[77] An expert of vkw has a similar perspective on the role of building companies.

> "For building companies e-mobility is a very important topic. Especially the political setting of the course has accelerated the development. The exemption of fringe benefits has the effect that people get a pay rise if they drive an e-vehicle. This was a significant incentive for construction managers as for them it is easy. They drive from construction site to construction site and can also use site power supply. This makes it attractive for companies as well as employees. We have noticed a boom that still continues today. These product solutions, these business models are very well received and we want to develop them accordingly and make the whole thing more attractive. A complete carefree package, so to speak, for both the fleet operators and the users."[78]

E-mobility has now become a wider diffused technology, but when the building company decided to switch their conventional fleet to an electric one, they were one of the first. In 2015, they already had 15 e-vehicles and by the end of 2018 they aimed at 100 e-vehicles. They describe themselves as pioneers in this field, but without the support of vkw the whole endeavour would not have been possible.[79] The management of the company stated that they usually want to be

[76] Ibid.
[77] Ibid.
[78] INT-7 2017.
[79] INT-12 & INT-13 2017.

a frontrunner. Testing new technologies and opportunities is a key characteristic. Building companies are rather conservative, but he wants to make a difference, also ecologically.[80]

The employee of the company has a slightly different standing. Apparently he had some prejudices, but as he is pro new technologies, he was also pro e-mobility, he stated. The user commutes 80 km one way every day. Before the transition he would take his own car, now he uses his business vehicle. Planning of trips is now essential. The driver needs to know where the next charging station is, if it is occupied or broken. The planning was not necessary when he took a conventional vehicle, but this is no problem according to him. Taking a motorbike also requires thorough planning, he states. On his way home he makes one 10 minutes stop 20 km before his home as there is a charging station he can use for free. If the weather is exceptionally bad, he charges at home. This practice makes it possible for him to drive to work without having to charge his e-vehicle. The next charging will take place at work at the fast charging station. So far, he never broke down or got stuck, but it was close once. When asked what he did then, he answered: "You don't need a heater, it really warms you up! From sweating, right!"[81] In the beginning he was anxious and thought about buying a diesel aggregator set for the boot, but after one year he has overcome this anxiety. It is all a matter of getting used to it. To him this is a question of attitude and he is fine with taking an e-vehicle on a daily basis. The reason why he stops 20 km before his home is costs. He does not have a wallbox at home and he could charge his e-vehicle with a normal wall socket, but he tries to avoid using it. He has charging options at work and in the public, but no certified e-vehicle charging option at home. The barrier of costs is also apparent in his reasoning for not getting an e-vehicle privately. He would get an e-vehicle instantly, if it was not that expensive in purchase and the charging. Also, he likes to use his vehicle to go on holidays, but the limited range makes this difficult. Another aspect is that he would like to resell his vehicle after a while, but paying double the amount for an e-vehicle and the resale not being attractive due to the battery is keeping him from e-mobility as well.[82]
During the interview with the user one of the managers was present. It seemed as if the user gave honest answers and stated his opinion. However, when it came to his reasons for not being willing to buy an e-vehicle at this point in time, the manager chimed into the conversation and stated his perspective. He did not agree with the holiday argument. One goes on a holiday approximately twice a year. For this a different vehicle could be rented. The manager said that for

[80] Ibid.
[81] INT-14 2017.
[82] Ibid.

short distances one has to take on a daily basis, an e-vehicle is sufficient. Holidays, however, are an unusual occurrence and for this matter a rental vehicle would be fine.[83]

When the user was asked if he uses the e-vehicle for private reasons, he said no, unless his wife uses the combustion vehicle, then he has to. With this combustion vehicle he used to drive to work before he was given an e-vehicle. This is an example for what Andrew Barry calls the informed individual. "In a society of communication the individual is *not* kept under continuous surveillance. Rather government is possible by making the individual members of the population interested, informed, and responsive. Liberal government relies on the existence of the informed citizen." (ibid. p. 48).[84] In this case, the informed individual, the user, still has the choice if they want to transfer their business practices to their private life. The employee of the building company chose not to use the e-vehicle privately, which is fine, as he is fine with using the e-vehicle for business matters. By this a practice change has been introduced into the business life, but affects the employee's private life only marginally. However, social control is already mildly taking place. In the company the prevalent attitude is that the mobility behaviour needs to be reconsidered. This became clear with the holiday discussion.

Overall, the company is very satisfied with the contracting solution and with the partnership with vkw in general. At the time of the interview (2017) a new business site was under development. E-mobility is also a central interest here and vkw is involved in the planning.[85]

5.5 VLOTTE AS A TECHNOLOGICAL ZONE

Even though environmental aspects might be at the forefront of the decarbonisation process in Vorarlberg and the EU, vkw also has a clear economic interest in pushing the transition and e-mobility forward. This economic interest is being explained with Andrew Barry's concept of the technological zone.

Andrew Barry defines a technological zone "as a space within which differences between technical practices, procedures or forms have been reduced, or common standards have been established." (Barry 2006, p. 239). There are three characteristics of technological zones: 1. "[T]echnological zones will not, in general, be territorially continuous or uniform. They may overlap with, or contain, other zones, and they are likely to be fractured and contested." 2. "Zones are not

[83] INT-13 2017.
[84] Emphasis in the original.
[85] INT-12 & INT-13 2017.

structures, territories or regions, but discontinuous spaces of circulation and regulation. They are not bounded by continuous borders, but interrupted by shifting restrictions and blockages and points of conflict." 3. "[T]he term zone is intended to convey a broader sense of a field which has been marked out and mapped, measured and regulated. Zones are framed and reframed by instruments and markers. Marking out zones is often taken to be a form of political action." (Barry 2001, p. 4of.). VLOTTE is a technological zone. Even though it started as a regional project, it has been developed to a business model which aims at diffusing e-mobility solutions in Vorarlberg and beyond. This business model is not only set to stay in Vorarlberg, but can be extended to other regions or countries. Even though the offer is targeted at people in Vorarlberg, the solutions developed by vkw can be applied anywhere.

Next to its function as a networking tool, the Mobilitätszentrale has another function as a tool for standardisation. "Standardisation is both expected to reduce blockages and restrictions in the circulation of technology and to create new, more secure technological zones with clear and well-policed points of access." (ibid. p. 63). So far people interested in e-mobility have few options to turn to for information. Interviewee 2 stated, that before the Mobilitätszentrale was established, there was no comprehensive locality that covered the whole e-mobility topic, as in e-vehicle, public and private charging infrastructure, different kinds of plugs and charging capacity. There are many different eventualities to be considered before being able to decide which e-mobility solution is the right fit. This barrier is managed with the Mobilitätszentrale and the low-threshold consulting service.[86]

Standardisation is also the basis for comparability. Barry states that the comparability of a technological zone is a "form of measurement". By being able to compare one technological zone with another, competition is taking place. A recurrent theme during the interviews was the comparison with Germany. One expert stated that the interest of customers in e-mobility is becoming intrinsic and that this is something people in Germany cannot imagine at the moment (2016).[87] Being ahead of the large and important neighbour is an asset and having the solutions at hand before other competitors have realised the importance of this undertaking is an absolute advantage. The Mobilitätszentrale is a knowledge hub and an invention of vkw. It did not exist before the project ELMOS. The overall idea was that a neutral information provider is needed where interested people can turn to. One important aspect that has been highlighted by several

[86] INT-2 2016.
[87] Ibid.

interviewees is neutrality. Theoretically, everyone could call the Mobilitätszentrale, even though the core audience are people of Vorarlberg[88], to get expert knowledge on e-vehicles, charging infrastructure, renewable energy and grids. In 2015, the Mobilitätszentrale was established as a showroom. This showroom is not only an opportunity for customers, but also for local auto dealers.[89] "[A] technological zone can be understood as a structuring of relations, which has a normative force, but one which does not necessarily take a disciplinary form." (Barry 2006, p. 241). Standardisation does not stand for selling one certain product of one specific company, but introducing a standard of e-mobility consultation. By stressing the neutrality of the consultation service, trustworthiness is communicated to customers and other actors.

In today's society standardisation is taken as self-evident. When a technological device is purchased, the consumer expects it to be working. Nevertheless, this is not usually the case with new technology. The following example of VLOTTE shows why standardisation is crucial for the diffusion of a new technology. It also explains Barry's concept of harmonisation. "Harmonisation is a spatial and a political project. The ambition of harmonisation is to make it possible for technical devices and regulations to work across an extended area." (Barry 2001, p. 78).

5.5.1 SHOW CASE II[90]

Show case II is a parking garage on the premises of vkw in Bregenz. As the mobility department decided to transform their fleet with combustion vehicles to a fleet with e-vehicles, charging infrastructure needed to be developed. There is an existing parking garage, which has only a limited grid connection. It is not construed for 18 e-vehicles charging simultaneously. Therefore, the mobility department of vkw commissioned vkw to develop a solution.

With the growing numbers of e-vehicles, providing charging infrastructure will be a challenge. Another challenge will be avoiding peak loads and making use of the existing grid without having to extend it. From a grid operator perspective this is relevant, as the grid is planned for a timeframe of around 100 years. Shifts in energy demand are difficult to manage and peak loads need to be avoided. Even if the grid would tolerate several vehicles charging simultaneously, the grid operator needs to prepare for the case that all e-vehicles get charged at the same time. The grid operator also needs to prepare for more e-vehicles using the parking garage and charging

[88] INT-4 2016.
[89] INT-2 2016.
[90] A detailed analysis of the "EV car park" can be found in the MATCH reports D2.1 and D3.1.

infrastructure. Growth needs to be calculated from early on. Regular grids in parking garages or buildings are not built for this extreme case. If in one building several e-vehicles are being charged simultaneously, the grid will probably not be able to provide the demanded energy and tripping of the fuse can occur. It is also not desirable to expand the grid as this is too expensive and the benefits of e-mobility in comparison to combustion vehicles are not effective.[91] Different solutions are under development to solve these problems. One of these solutions is load management.[92] Load management is applied in the car park on the premises of vkw. As the mobility department decided to convert their fleet from a combustion vehicle fleet to an e-vehicle fleet, charging infrastructure needed to be established.[93] The mobility department is part of vkw, but also a customer in this case. Vkw was commissioned to develop a solution, as the only other option would have been to run new cables, which would have been too costly. The solution works very well and all parties are satisfied. While it does work now, it will need to be further developed when more e-vehicles are added to the fleet.

Vkw uses this case as a demonstration to prove that it works by using it on a daily basis. It is also the only demonstration project in this dimension.[94] This can be seen as a preparation for future building projects. As the legislative has already reacted to the need of buildings being prepared for more e-mobility, load management will also be of interest for this case. When people return home from work in the evening, they will need to charge their e-vehicle overnight. If users tell the system when they will need their e-vehicle to be charged, load management could distribute the needed electricity accordingly. With testing this case under real-world conditions, vkw is already preparing a solution for future needs. However, at the moment there are still some technical difficulties that cannot be solved yet. One problem is that the battery status is not communicated to the charging system yet. So, drivers have to manually let the system know the battery status, which does not work at all. Therefore standardisation is crucial for vkw and VLOTTE.

> "If I now buy ten wallboxes from ten manufacturers, I have ten interfaces. The solution we have now works with one wallbox. If we were to buy another one now, we would have to change the solution. This is of course a huge problem. When a product is ready for the

[91] INT-9 2017.
[92] Electricity is usually supplied steadily, but during peak hours at certain places more electricity can be demanded than being supplied. With load management the supply of electricity is being matched with the demand. In the case of the parking garage this can mean, that the e-vehicles are being told that they do not need to charge with 22 kW as 11 kW are sufficient. This is done to avoid overloading the grid as fuse tripping might occur otherwise, but peak loads are also expensive. Load management is therefore also an economic solution.
[93] INT-7 2017.
[94] INT-10 2017.

> market, I have, of course, to be open for different manufacturers. The issue is there is no standard."[95]

He uses the example of the smartphone chargers, which have been standardised not so long ago:

> "You've seen how long it takes with the smartphone. At some point there was a rule that you should load it with USB. In the beginning, every manufacturer made a different plug for the charger. Now Apple has its plug and the others have USB and you can get Apple charging with USB. It has already been standardised, but in our area there is nothing at all. Everyone is doing – consciously, I say – their bit."[96]

It was the same with the charging plugs for e-vehicles, but the EU has standardised the plugs in 2013 as the type 2 connector. The only problem is that the conductor in the connector has not been standardised. So, the battery status cannot be communicated properly which blocks the load management solution in the parking garage. This is also a problem for future solutions in private buildings. To avoid peak loads, the battery status needs to be communicated when a person wants to charge their e-vehicle overnight. If the e-vehicle communicated the time automatically, soft charging could be managed. Currently, when an e-vehicle is plugged in, it gets charged immediately. This is problematic, as a charging process takes several hours, which is not in the interest of the grid operator, but also not in the interest of the vehicle owner. The grid operator wants to avoid peak loads as a steady distribution of electricity is optimal. The consumer wants to avoid peak loads as they are expensive.[97]

The interviewee stated that standardisation is the basis for the proper development of a solution, which can be diffused later on. With the example of the charging plugs he addressed one problem, which has also been elaborated on by Andrew Barry. The lack of harmonisation and standardisation is a well-known obstacle for companies and economies (ibid. p. 71). Its significance is also known to the European Union. Nevertheless, the EU has to rely on other actors and committees as the EU commission is simply too small to take care of all these issues at once (ibid. p. 72). This was also mentioned by the expert, when he explained the complex problem of the absence of standardisation.

> "There are such tendencies that standardisation may be introduced for the charging infrastructure, but it will take some time. That is dragging on. We see in these projects, that the lacking standardisation is a huge problem for us. I really have to tell the

[95] INT-11 2017.
[96] Ibid.
[97] Ibid.

> customer, you have to buy me this certain product. If they have a stock, it is a huge problem. That is something we have noticed. You can't change the whole issue of standardisation at the moment."[98]

They are hoping for the problem to be solved soon, but when he was asked if the committees knew about the problem, he laughed, and said:

> "I hope so, yes. Well, I only know that our people, who sit in these committees, have communicated the problem. But until when something is going to happen… I definitely can't say. All I know is that it's a huge technical problem for me. Much nicer solutions would be possible if we had a standardisation. This applies to all the solutions. Whether we look at it from a grid perspective or from a customer perspective."[99]

Another aspect these quotes highlight is the significance of networks. What kinds of networks are relevant for VLOTTE is discussed in the following chapter.

5.5.2 NETWORK STRUCTURE OF THE TECHNOLOGICAL ZONE VLOTTE

VLOTTE does not work because it is located in Vorarlberg, but because the supporting network was already established in Vorarlberg. Several interviewees have stressed the importance of the network. On the federal state level the Klima- und Energiefonds is central. The Klima- und Energiefonds is the architect of the program for the model regions and created an online platform to bring the different regions together. Meetings were held twice a year in the different e-mobility regions and knowledge exchange was one of the most important aspects that have been stressed by several experts. Additionally, KLIEN was also responsible for public relations of the program and sometimes also for projects. Events were organised, reports and other works published.[100] This shows that the federal government saw an obligation of keeping the e-mobility regions in contact and create a wider network in Austria. Even though every region had their own characteristics, learning from each other was key and future co-operations were of interest.

On the regional level vkw was the central actor, Raiffeisen Leasing GmbH was a contributing financier, the Vorarlberger Landes-Versicherung V.a.G. developed together with vkw a battery insurance solution as batteries did not last for a long time back then, and the state Vorarlberg. It was beneficial that vkw is well-connected in Vorarlberg and the state Vorarlberg as the owner

[98] INT-11 2017.
[99] Ibid.
[100] INT-5 2017.

of illwerke vkw was also a great supporter. Research partners were the Energieinstitut Vorarlberg, and the Technical University of Vienna.[101] Now, as the diffusion of e-vehicles is reaching a new level, the grid operator is a central contact for the e-mobility team. In the early days e-vehicle charging was only minor and did not strain the grid, but better and more e-vehicles embody a different kind of challenge, states the expert from the grid operator.[102]

This impression is fostered by different activities of VLOTTE. Besides supplying energy in Vorarlberg, vkw also supplies energy in the West Allgaeu. Therefore, e-mobility solutions are also available in this part of Germany. Then, VLOTTE is part of the international Park & Charge alliance, which maintains charging points in Austria, Germany, Switzerland and Liechtenstein (vkw 2019c). And last but not least, vkw opened a branch of VLOTTE in Salzburg in 2017. In the sustainability report of illwerke vkw this is described as overcoming borders and breaking new ground (illwerke vkw 2017, p. 7). Apparently, this is the first of many more steps as it is further stated that more customers in more states shall be won over to e-mobility (ibid.). Even though it is only referred to other states (*Bundesländer*), the close proximity of Salzburg to Germany might have been another reason for the strategic positioning of VLOTTE's first branch, as there are many commuters in this area who either live or work in Salzburg or Germany.[103]

[101] INT-4 2016.
[102] INT-1 2016.
[103] In 2014 a feasibility analysis for a cycle highway was carried out to realise an alternative to the through road between Salzburg and Freilassing. As many workers commute via this route sustainable alternatives are of interest to the region. The feasibility study has still not been published for reasons unknown (EuRegio Salzburg 2014; Ornetzeder, Capari & Gutting 2016, p. 64).

Figure V: Map of Salzburg with the vkw VLOTTE branch. Screenshot taken by the author, February 2019 https://www.google.com/maps/place/VKW+VLOTTE/@47.806978,13.0090845,13z/data=!4m5!3m4!1s0x4776901aed4a1c75:0xbd8ab08392d561dc!8m2!3d47.8069744!4d13.0112785.

Border-crossing charging opportunities become more and more important. It was stated, that customers request information on how and where outside of Vorarlberg they can charge their e-vehicle. The user ascribes this to the wider range of e-cars. It is problematic that "the one" charging card does not exist yet (2016) and this complicates long-distance travel with e-vehicles. In Vorarlberg it is not necessary to have a charging card, as paying with a debit card at the charging point is possible.[104] This might be a possibility at charging stations from other operators as well, but paying for charging with a designated charging card is more convenient.

In a technological zone, borders are being controlled. Andrew Barry describes borders as "a well-defined barrier, which restricts the movement of certain categories of persons, objects and information" (Barry 2006, p. 245). The Mobilitätszentrale as a full-service information hub does not only have benefits for the people interested in e-mobility or for traders. It is also a way of controlling the e-vehicle diffusion. To be able to install a wallbox, the grid operator needs to be informed. Today's wallboxes use 22 kW. This is a rather high amount of electricity and usually private people get around 11 kW. In some cases, it can be that not even 11 kW are available. If a private user buys a wallbox at the local electronics market and installs it at home, the grid operator might not notice immediately, but peak loads are very likely and as the grid operator needs to know the electricity demand and the consumer needs to inquire for a power connection for

[104] INT-3 2016.

electronic devices that have a high consumption of electricity. So, if a potential customer asks for advice at the Mobilitätszentrale, vkw also assists with the paperwork. In doing so, control over the diffusion of charging stations is kept and peak loads can be better managed.[105]

This control of borders is also a way of securing the market. One expert states:

> "Our business model is developing into the direction that we want to offer full service for fleets of larger companies. Full service means a complete solution with wallboxes with a billing system, variants of in-contracting, but also for purchase. This is up to the customer, what they want. As this business field is still so young and as it is continuously further developed, it is very important for us that we are close to the customer, that we get feedback on their experiences, so we can further develop our products."[106]

Furthermore, Vorarlberg is also a tourism area and it is very important that charging infrastructure will be available in hotels. Contracting models will be essential where VLOTTE co-operates with hotels. Billing models are not of interest, as e-mobility users often have charging cards from their home countries. As VLOTTE has the integrated charging solution through the Hubject platform[107] it is possible that e-mobility users can use the same card wherever they go. Billing is dealt with by the provider they have at home.

> "These are things that make the whole thing easier. The user does not have to worry about anything, where they have to charge, how they have to pay. Apps and charging options will grow deeper into the different sectors, such as hotels, but also retail parks. People will say: 'Okay, when I'm shopping, I can use the time to charge my car quickly and I don't need to worry. I can pay directly here with my card. I've got my own model that suits me.' Either billing or a flat rate or one-time payments. We will offer the right model.[108]

This shows that in the technological zone VLOTTE it is aimed at reducing differences "between technical practices, procedures or forms" and that "common standards" are going to be "established" (ibid. p. 239). It also shows that vkw keeps control over the e-mobility network in Vorarlberg and its surroundings. By creating a convenient full-service offer, there is no need to contact other competitors. The knowledge on e-mobility is being centralised at vkw and the Mobilitätszentrale.

[105] Ibid.
[106] INT-7 2017.
[107] Hubject is a co-operation of 275 partners, which was founded in 2012. With hubject charging infrastructure is being connected in Europe, see: https://www.hubject.com/en/.
[108] INT-7 2017.

6. CONCLUSION

The research field of anthropology of energy has changed significantly since the times of Leslie White in the 1940s. Nowadays, anthropologists are interested in different research directions, be it renewable energy or oil extraction or something entirely different. One aspect of energy research that has been neglected is experts of energy. These experts, often engineers, play a major role in energy generation, energy supply as well as energy politics. In times of climate change researchers and political bodies such as the European Union have called for yet another transition of the energy system. This transition will be implemented on several levels and already affects not just technological components, but also social, cultural and political aspects. An energy system transition can have many faces and one of these faces is the decarbonisation of the transport sector. As has been pointed out in this thesis, the transport sector is one of the greatest generators of emissions and therefore a primary target of implemented change. A transition is only successful if it is strategically conducted. In the case of Vorarlberg and VLOTTE, governance took and still takes place through the state of Vorarlberg and the energy provider vkw, which is owned by the state.

Central to this thesis is the expert view on the transition. The interviews were conducted roughly ten years after VLOTTE became the first Modellregion Elektromobilität of Austria. In total fifteen interviews with experts from vkw, a government institution, a research partner and users from vkw and a co-operating company were conducted. Through the interviews, the network of vkw was identified, the history of the Modellregion and how these experts make sense of the success of VLOTTE. Vkw as the main responsible actor made use of their close connection to the state of Vorarlberg, but also of their reputation in the state. For the energy provider to participate in the program was an experimental endeavour, but also economically feasible due to the financial situation during the project phase. For the state of Vorarlberg, governing the transition through vkw is a form of executing power. The upcoming decentralisation of the energy system will make the system more democratic, but it will also strip the energy providers of their current responsibilities. If energy providers do not plan now for future changes, there will not be much business left for them. Therefore, by being the main coordinator of the Modellregion Elektromobilität, vkw and the state of Vorarlberg have secured themselves a rather strategic position. The state of Vorarlberg has also aligned the framework of VLOTTE with the energy and e-mobility strategy. As Vorarlberg wants to become energy autonomous by 2050, vkw is actively supporting the state's strategies.

VLOTTE can be differentiated into three different phases. There was the first phase as the Modellregion Elektromobilität, which was rather experimental. The second phase is a further developed project phase where VLOTTE was also involved in EU-projects and where the Mobilitätszentrale was established. The third phase is also the current phase, where VLOTTE is a business that is continuously further developed. The Mobilitätszentrale in particular can be seen as the heart of VLOTTE, where the technological solutions meet the social, but also where the network is coming together. The Mobilitätszentrale functions as a meeting place, event venue and information hub. It is part of vkw's trust building measures. Customers can contact the team here, but also potential partners such as auto dealers or electricians can get in touch with the team.

Vorarlberg and vkw have been portrayed by several experts as down-to-earth, sustainability-oriented and with short distances, concerning communication and geographical distances. Austria, as well as Vorarlberg, follow the policy of the European Union on renewable energy and the decarbonisation of the transport sector, but Vorarlberg is significantly successful in these matters. The reason is that Vorarlberg has been applying rather strategic measures to involve different actors into their undertaking. There is the sustainable image of Vorarlberg, which is used as a marketing tool for the tourist destination, but is also part of Vorarlberg's self-understanding. Sustainability also means being open to rather unorthodox methods, involving users and customers, willingness to learn and a strong dedication to the cause. Involving customers and users gives them a different kind of power. They do not only decide for or against a product by buying or not buying. In the case of VLOTTE customers get involved in the planning of future products. Vkw has been presented by the experts as a company that is interested in customers commissioning them to develop new products that match the customer's needs. This is rather specific and profitable for vkw through contracting. However, the Use Case has also shown that the involvement of the user can affect the user's autonomy. This does not seem a problem for the employee of the company, but in the future this might be problematic for other people affected. Expecting people to be informed and being flexible in their practices is critical.

Building trust with their employees, as well as with the public is a major aspect of VLOTTE's and vkw's success. Involving customers into project development is one thing, but vkw has invested much time, money and energy in raising awareness among their employees. Change needs to happen as soon as possible, stated one expert and this can only be initiated if done cooperatively with collective learning. By involving people and connecting the cause with social practices, the learning becomes meaningful instead of just having to follow a new order. The initial prejudices

people might have against e-mobility is being worked on by introducing e-mobility in the work context. In this way people can try e-vehicles without having to invest. Furthermore, in the Mobilitätszentrale several e-vehicles are at display and can also be taken on test drives, even over the weekend, for just 5€ per year. Here, the strategic approach becomes apparent again. Collective learning is a major contributor to the implementation of change. The Klima- und Energiefonds might have provided the framework for the e-mobility project, but the governance is vkw's own making. It was beneficial that the social aspect of the transition was always central, which has been stated by several experts. The early users were not left alone with the new technology, but also in the third phase vkw is being hands-on. With their close connection to the state, needs can be better communicated and vkw's standing is solid. This close connection also allowed the mobility team to develop new, out of the box solutions. There was always a great deal of trust within vkw. The management trusted the mobility team and the state trusted vkw. This made it possible for the company to flourish in this strange new work field, but also to convince the team and the public.

VLOTTE has profited off the foresighted e-mobility team of vkw that was courageous enough to walk new ways, but also cautious enough to shift the risk to institutions instead of individuals. They perceive themselves as pioneers, who have proven their critics wrong and who have contributed to a fundamental change of mind in the whole of Vorarlberg. This all sounds very heroic, but besides wanting to decarbonise the transport sector, vkw also wants to open up new market opportunities. The foresighted approach of vkw has secured the energy provider a leading position in an emerging market, which will be expanding not only in Vorarlberg, but also in countries in close proximity to the state. Vkw is in the midst of building their own technological zone, where they control the further development of the network and are the central actor of the transition to a renewable Vorarlberg. Their advance in knowledge has already borne fruit at the end of the project phase, when vkw was contacted by other actors to participate in EU research projects. Vkw has shown to appreciate opportunities and has made the most out of them, without forgetting to involve their customers. This has proven to be the right way and still is being continued.

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APPENDIX

LIST OF INTERVIEWS

Interview partner	**Type**	**Institution**	**Date**	**Place**
INT-1	Expert	Vorarlberg Netz	November 2016	Vorarlberg
INT-2	Expert	vkw	November 2016	Vorarlberg
INT-3	User	vkw	November 2016	Vorarlberg
INT-4	Expert	vkw	November 2016	Vorarlberg
INT-5	Expert	Klima- und Energiefonds	January 2017	Vienna
INT-6	Expert	Technical University of Vienna	January 2017	Vienna
INT-7	Expert	vkw	May 2017	Vorarlberg
INT-8	User	vkw	May 2017	Vorarlberg
INT-9	Expert	vkw	May 2017	Vorarlberg
INT-10	Expert	vkw	May 2017	Vorarlberg
INT-11	Expert	vkw	May 2017	Vorarlberg
INT-12	User	Building company	May 2017	Vorarlberg
INT-13	User	Building company	May 2017	Vorarlberg
INT-14	User	Building company	May 2017	Vorarlberg
INT-15	Expert	vkw	September 2017	via phone

ABSTRACT (ENGLISH)

In this master thesis the development of the model region electromobility VLOTTE is traced for a period of almost ten years. VLOTTE was the first e-mobility model region of Austria and has since developed into one of the most successful e-mobility regions in the European Union. The company Vorarlberger Kraftwerke AG (vkw), the local energy operator owned by the state of Vorarlberg, is responsible for this development. In the course of time, VLOTTE has developed from an initially experimental project into a successful business model. The fact that an energy operator is serving as an advocate of e-mobility is rather unusual at first glance, but fits well into the larger political concept of Vorarlberg with its 101 Enkeltauglichen Maßnahmen and its e-mobility strategy. In addition to the history of the region, the actors are at the centre of this study. Fifteen interviews were conducted with experts from the company, the scientific community and a funder, as well as with users from vkw and a cooperating building company. These interviews show why VLOTTE is so successful, how these participants explain the success and that, in addition to environmental reasons, a strategic orientation in times of the decentralisation of the energy system is particularly important.

ABSTRACT (DEUTSCH)

In dieser Masterarbeit wird die Entwicklung der Modellregion Elektromobilität VLOTTE über einen Zeitraum von knapp zehn Jahren nachgezeichnet. VLOTTE war die erste Modellregion Elektromobilität Österreichs und hat sich in der Zwischenzeit zu einer der erfolgreichsten E-Mobilitätsregionen der Europäischen Union entwickelt. Verantwortlich zeichnet sich das Unternehmen Vorarlberger Kraftwerke AG (vkw), der lokale Energiebetreiber, der sich im Besitz des Landes Vorarlberg befindet. Im Laufe der Zeit hat sich VLOTTE von einem anfänglich experimentellen Projekt zu einem erfolgreichen Geschäftsmodell entwickelt. Dass sich ein Energiebetreiber als Befürworter von Elektromobilität verdient macht, ist auf den ersten Blick eher unüblich, passt jedoch äußerst gut in das größere politische Konzept des Landes Vorarlberg mit seinen 101 enkeltauglichen Maßnahmen und seiner E-Mobilitätsstrategie. Neben der Historie dieser Region stehen die Akteure im Zentrum dieser Untersuchung. Dazu wurden fünfzehn Interviews mit Experten aus dem Unternehmen, der Wissenschaft und einem Fördergeber durchgeführt, sowie mit NutzerInnen aus dem Unternehmen vkw und einem kooperierenden Bauunternehmen. Diese Interviews zeigen, warum VLOTTE so erfolgreich ist, wie sich diese Beteiligten den Erfolg erklären und dass neben umwelttechnischen Gründen insbesondere eine strategische Ausrichtung in Zeiten der Dezentralisierung des Energiesystems im Vordergrund stehen.