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Local Carbon Budgets as a Governance Tool for Sustainability Transitions: A Case Study from Västra Götaland

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Abstract:

A growing awareness of the severity of the climate crisis caused by anthropogenic greenhouse gas emissions has led to an increased effort to find governance strategies to transition society towards sustainable development. One recently adopted strategy is the adoption of local carbon budgets, derived from the so-called global carbon budget, within local governments across Sweden. In this thesis, I explore this happening through a case study of the county of Västra Götaland, Sweden using the concept of governmentality to provide critical analysis of the use of local carbon budgets in an attempt to encourage reflexive governance. By conducting semi-structured interviews with persons involved in the adoption of local carbon budgets in Västra Götaland, I seek to gain a greater understanding of how local carbon budgets impact the way actors seek to govern climate through the adoption of new programs of conduct that seek the reform of the current regime of practices that exist within the county. I explore how such carbon budgets construct the problem of climate change and the need for rapid decarbonization to discover what practices are limited or made possible through such a construction. I find that local carbon budgets are problematizing several areas of municipal and regional governance, conceptually and practically, particularly in the way actors understand climate change and the decarbonization challenge. I argue that a reterritorialization of the climate into local 'emission spaces' allows for the quantification and distribution of limited 'emissions resources' amongst actors in the county. This territorialization and quantification of a constructed resource contribute to a perception of urgency critical to motivating action to decarbonize. These conditions create a mandate for political action to resolve the constructed problem of scarce 'emissions resources' within a municipality or county's 'emissions space' to ensure a 'fair' distribution in society. I further suggest that actors adopting local carbon budgets should consider the application of common-pool resource management strategies to move governance beyond an internal carbon budgeting approach.

Keywords: Sustainable Development, Governmentality, Carbon Budgets, Climate Governance, Sustainability Transitions, Common-pool Resources

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List of Abbreviations

AR5 – Fifth Assessment Report

CCL – Climate Change Leadership Node at Uppsala University

CO_2 – Carbon Dioxide

CPR – Common-pool Resource

GHG – Greenhouse Gas

IPCC – Intergovernmental Panel on Climate Change

LCB – Local Carbon Budget

STR – Sustainability Transitions Research

tCO_2 or tCO_2e – Ton of Carbon Dioxide equivalents

UN – United Nations

UNFCCC – United Nations Framework Convention on Climate Change

VG – Västra Götaland

VGL – Västra Götalands Länstyrelssen

VGR – Västra Götalands Region

1. Introduction

Scientific evidence has been mounting over the last half-century that current models of human development have created conditions that undermine the life-supporting systems of our planet (Rockström *et al.*, 2009; Hoekstra and Wiedmann, 2014). Recognition of the potential of continuing anthropogenic climate change to destabilize the environment and create an increasing number of challenges to human and non-human communities has led to its increasing prominence in discourses of sustainability (Anshelm and Hultman, 2014). The growing urgency in calls for further action and ever more dire prognostics of climate scientists have joined with those of indigenous peoples and environmental activists, among others, in demanding rapid decarbonization of advanced industrial societies to avert the most serious consequences of global climate change (Lahn, 2020a).

The adoption of the 2015 Paris Agreement by 196 countries as a global commitment to prevent irreversible effects from global warming and limit it to well below 2°C above pre-industrial levels (UNFCCC, 2015) signals a shift in the approach to climate governance at a global level (Lahn, 2020b) and represents an important goal in efforts to achieve sustainability. This goal is represented as a total amount of carbon-equivalent greenhouse gasses (GHGs) that can be emitted into the atmosphere before the two-degree threshold is exceeded. The various calculations of global, cumulative GHG emissions-minus-sinks measured against a given temperature target are known as global carbon budgets (Peters *et al.*, 2015; Anderson *et al.*, 2018; Friedlingstein *et al.*, 2020).

The majority of research on carbon budgets is characterized by a highly technical, global-level natural science approach with a lack of research from a social science perspective (Peters, 2016, 2018). A research gap in carbon budget research is the "applicability and policy usefulness" of the carbon budget (ibid., p. 649). Indeed, Peters (2018, p. 378) goes as far as to say that "the carbon budget concept…lacks policy utility" due to key uncertainties, arising both from the climate system as well as the 'social choices' selected in the modeling to create the multiplicity of carbon budget scenarios. However, this assertion seems to have been overstated, as there is a growing interest, in Sweden at least, in applying the carbon budget concept as a governance tool (Anderson, Stoddard and Schrage, 2017; Anderson *et al.*, 2018).

In Sweden, several municipalities, county councils, and county administrative boards have expressed interest in acting on the Paris Agreement directly by adopting carbon budgets as a policy tool to stimulate transformative change (Anderson *et al.*, 2018). As a first step towards developing a framework for local carbon budgets (LCBs), these governments solicited the assistance of researchers at Uppsala University's Climate Change Leadership Node (CCL) in developing suggested LCBs that are compliant with the Paris Agreement. Within the county of Västra Götaland (VG), the county government, Västra Götalands Region (VGR), and several municipalities have moved forward with this report and are at various stages of implementing LCBs based upon it. There are only a few examples of carbon budgets being officially implemented at any level of government as a policy instrument and regulatory tool, with the municipality of Järfälla being the first municipality in Sweden to adopt an LCB based on the CCL framework in 2017 ('Koldioxidbudgetprojekt för kommuner, regioner och län', no date). These cases are relatively recent, and it is necessary to investigate these early cases to understand how carbon budgets are being implemented, and what they mean in the greater context of local climate governance and sustainability transitions. These early adopters and frontrunners, such as those in VG, are likely to act as a benchmark against which other actors will judge LCB inspired policies and outcomes.

The study of societal efforts to address the persistent issues of unsustainability is referred to as sustainability transitions research (STR) (Loorbach, Frantzeskaki and Avelino, 2017). Within the field of STR, some researchers have sought to understand past and ongoing societal transformations from a governance perspective. Such a perspective addresses three important issues, 1) the historical context of systems in transitions towards sustainable development, 2) how changes in practice and structure are constrained or enabled by long-term trends, and 3) the politics that are intrinsic to processes of change (Grin, Rotmans and Schot, 2010). Since "governing takes place through the ways

in which issues are problematized" (Bacchi and Goodwin, 2016, p. 39), and Lahn (2020b) argues that carbon budgets can be understood as a new problematization of the climate change issue that produces new political effects, a governance perspective on transitions can be useful when attempting to understand the implications of the introduction of LCBs into the network of actors and their practices of climate governance within VG. In my thesis I seek to address the research gaps outlined above: the lack of research on the implementation of the Anderson *et al.* LCB framework, the applicability and policy usefulness of the carbon budget concept from a social science perspective (Peters, 2018), exploring the political effects generated by carbon budgets (Lahn, 2020b).

1.1. Aim and Research Questions

In this thesis, I employ the concept of governmentality to understand the governance of sustainability transitions. By investigating how LCBs within VG construct the persistent problem of carbon emissions and intend to govern how actors in VG should act to achieve a sustainable outcome, i.e., decarbonization, a governmentality approach can contribute to understanding how the three issues, presented in the preceding paragraph, considered within governance perspective on sustainability transitions are interconnected within the practices of governing as well as attend to the identified research gaps. I contend that understanding the rationalities and technologies brought to bear in the governance of the climate that is (re)produced by LCBs could give insight into how the sustainability transition in this region will develop and upon what rationalities and technologies it will depend. My research is intended to demonstrate how LCBs, as programs of conduct that modify regimes of practices of governance, make government of the climate possible through their particular ordering of strategies, rationalities, techniques, technologies, subjects, etc. into an assemblage for governance and explore what the effects of such government might be (see, e.g., Lövbrand and Stripple, 2011). To do so, I engage in an analytics of government with the intent of answering the following questions:

1) How do LCBs shape practices of governance within VG to render climate a governable domain?

2) What practices are made possible and what limitations are present within an LCB governance approach in VG?

A secondary objective of my study is to gain an understanding of how LCBs render the climate governable and might contribute to transitions towards sustainability in VG. Additionally, my overarching analytical approach, an 'analytics of government' (Dean, 2010), demands that I engage in reflexivity and consider how actors might think differently about governing based upon such an analysis. As such, my discussion will include my theorizations about what governance approaches LCBs make possible as well as their potential contribution to sustainability transitions.

In summation, my thesis addresses a research gap of how the carbon budget concept is applied within the policies of local governments and their efforts to govern the climate and society towards decarbonization. My study differs from prior research on carbon budgets in the study area; there is no previous published research on LCBs in Västra Götaland; theoretical perspectives applied, bringing governmentality closer to sustainability transitions; as well as focusing on the anticipated effects of LCBs on adjacent policy areas.

2. Background

2.1. On the Historical Development of Carbon Budgets

Before attending to the development of the concept of a global carbon budget, I provide a brief overview of global climate governance based on the work of Treut and Weill (2017) to provide some context for this development. Global climate governance is perhaps most easily associated with the international institutions within the United Nations (UN). Concerns about human impacts on the environment at the global level have been a subject of discussion since the 1970s but the institutionalization of these concerns into global governance frameworks had a watershed moment in 1992 during the UN Conference on Environment and Development, otherwise known as the Rio de Janeiro Earth Summit. By the conclusion of this conference, the UN Framework Convention on Climate Change (UNFCCC) was ratified. The ultimate aim of the UNFCCC is to mitigate anthropogenic GHG emissions to prevent dangerous warming of the climate. The UNFCCC includes several mechanisms to coordinate this effort including yearly conferences for the deliberation of additional measures to achieve this goal. Several treaties have resulted from these processes most notably the Kyoto Protocol in 1997 (UNFCCC, 1997) and the Paris Agreement in 2015 (UNFCCC, 2015). Another key entity is the Intergovernmental Panel on Climate Change (IPCC) (IPCC, no date). Established in 1988 under the auspices of the UN Environment and Development Program and World Meteorological Association, the IPCC plays a critical role in compiling and assessing scientific research on anthropogenic climate change and its consequences into reports that serve as authoritative sources of information on the state of climate change. The IPCC also developed the National Greenhouse Gas Inventory Program and the associated methodology for estimating GHG emissions of countries at the national level. These GHG inventories serve as the basis for which countries calculate their Nationally Determined Contributions (UNFCCC, no date) of GHG reductions under the Paris Agreement.

Lahn argues that the global carbon budget concept is an advancement in carbon accounting and management methods that have been used as a governance tool to combat anthropogenic climate change since the 1980s (2020a). The particular and specific construction of a global carbon budget, which combines a scientific account of how carbon interacts with various earth systems and a politically motivated temperature goal, he identifies as taking shape in 2009 and reproduced in the IPCC's Fifth Assessment Report (AR5) before migrating into the language of the Paris Agreement (Lahn, 2020a, 2020b). He further argues that the logic behind this concept can be seen within the emissions allowances enshrined within the Kyoto Protocol. Paterson and Stripple (2012) address the historical development of carbon accounting through their governmentality study. They trace the development of modern carbon markets back through time by identifying the changing concepts and units used to measure GHGs. Starting with the invention of the Global Warming Potential, adapted from an earlier climate crisis, the hole in the Ozone layer caused by various chlorofluorocarbons, this concept and calculation made various GHGs commensurate in warming effect, erasing the distinctions between them as to make them more comparable and usable within climate models to project future climate scenarios. They credit this conceptualization of GHGs as making the 'ton of carbon equivalents' possible as a unit of measurement to facilitate climate governance, codified within the Marrakesh Accords, to make the Kyoto Protocol actionable.

Schaltegger and Csutora (2012) identify three types of institutionalized carbon accounting that exist across spatial scales, from global to local: scientific, political-economic, corporate. These types serve mutually reinforcing roles in carbon management. Within this framework, political-economic accounts are understood as "provid[ing] orientation" to companies by "translating ecological information into economic terms and more or less specific policy goals" (ibid., p. 4). They further describe the role of political-economic carbon budgets as "relat[ing] natural scientific information with economic consequences" to "provide orientation to companies" and "foster political action" (ibid., p. 4). These political frameworks and corporate practices are developing in relation to each other to govern GHG emissions as scientific methods for the measurement of carbon continue to advance. Such an evaluation is in line with Ascui and Lovell's (2011) research on the development of conceptual framings in carbon accounting, where political carbon accounts have focused on the monitoring and reporting of GHG emissions within specified political, typically national, boundaries. This approach was precipitated by the United Nations Framework Convention on Climate Change and IPCC beginning in the 1990s with the Guidelines for National Greenhouse Gas Inventories which formed based on

the Kyoto Protocol (ibid.).

As described above, it is within this international milieu where the concept of carbon budgets took shape and has received the most attention. The work of the IPCC in providing policy-relevant information on the challenge of anthropogenic climate change is done so with international politics and governance in mind (Lahn, 2020b). Lahn reveals that previous accounts of global warming found in IPCC reports have centered around the stabilization of GHG levels within the atmosphere but that AR5 most explicitly focuses on the accumulation of CO_2 emissions and their near-linear relationship to warming and specific temperature goals, rather than achieving specific atmospheric concentration levels. He also argues that the enactment of the climate issue as a "single metric of allowable emissions" (2020b, p. 10) results in several important political implications: the full decarbonization of society, the complete phase-out of fossil fuels, questions of the distribution of the remaining emissions budget.

2.2. On the Organization of Sub-national Government in Sweden

Sweden is a unitary state, meaning that the subnational governments within it are delegated powers through the state at the national level. Sweden is both politically and administratively decentralized (Montin, 2015). Political decentralization takes the form of local self-government through the election of municipal and county councils, as required by the Swedish constitution. Local governments are organized at two spatial scales, the municipality (*kommun*) and county (*region*), with the jurisdiction of the former being independent of the latter, but existing within the boundaries of the latter (Montin, 2015). These two scales of local government also have distinct authorities and delegated powers. It is at this county level that aspects of the administration of the national government are also decentralized into county administrative boards (*länsstyrelse*) to effectuate the local administration of national agencies and policies (Niklasson, 2016). The terms *län* and *region* are often used interchangeably when referring to the territory of the county. To keep these entities more easily distinguishable to those less familiar with the political organization of Sweden, I will refer to these overlapping entities in the following way: the territory of the county as VG (Västra Götaland); the state apparatus of local government organized at the county level as VGR (Västra Götalands Region); the apparatus of national administration organized at the county level as VGL (Västra Götalands Länstyrelssen). To reiterate, my level of analysis and this case study is situated within the county, VG. This includes VGR and VGL, as well as the several municipalities and other civil organizations that operate therein.

The organization described above has important implications for my study. The differentiated areas of authority between local governments, municipalities and regions, and the national government established by Swedish law means that actors' authorities are often limited and shared in complex ways. Swedish municipalities enjoy a land and water planning monopoly within their jurisdictions to provide for social development (Montin, 2015). The nation, municipalities, and regions all have independent authority to tax (ibid.). Regional governments often act in a supporting role to coordinate regional development at the county level and providing essential welfare services (ibid.). However, the national parliament has the authority to regulate all of these powers to a lesser or greater extent. Both Montin (ibid.) and Niklasson (2016) argue that the strong trends of decentralization and regionalization since the 1980s have resulted in increasing collaboration at the regional level. Feltenius (2016) describes Sweden's system of governance as often non-hierarchical and negotiated, with a lack of formal rules over the implementation of national policy at the local level. National regulation and public administration are largely affected by national agencies. This is also true of climate policy (Granberg and Elander, 2007).

Local governments are not required to implement national environmental policies (ibid.). Instead, the national government often attempts to incentivize participation through grants, rather than sanctions and top-down control (ibid.) Sweden's current Climate Change Act was adopted in 2018 and establishes an overall objective of achieving net-zero GHG emissions by 2045 and negative emissions in the following years (Karlsson, 2021). This act is an evolution of an overarching policy framework

that addresses environmental issues, the Environmental Quality Objectives System (ibid.) The Climate Change Act modifies the language under this framework to reflect the aspirations of the Paris Agreement to limit warming to well below 2°C and pursue 1.5°C (ibid.). It should be clear that the application of the 2018 Climate Act within sub-national governments has been entirely at the discretion of those governments, with municipalities and counties each independently responsible for participating in climate governance according to local politics. This claim is supported by Granberg and Elander (2007) who highlight the variability in the adoption of additional climate change governance strategies and policies by local governments in Sweden that have been guided by national objectives. They show how municipalities, in many cases, engage in rhetoric emphasizing the need for emissions mitigations but find that implementation of strategies to achieve such is often lacking while at other times, municipalities go beyond the suggested targets set by national policy. The adoption of Anderson *et al.* (2018) LCB framework by several local governments in the absence of a national carbon budget framework seems to be an obvious example of this.

3. Theory

3.1. Sustainability Transitions Research

A theoretical lens for my research can be found in the interdisciplinary field of sustainability transitions research (STR), which has its roots in the intersection of science and policy (Loorbach, Frantzeskaki and Avelino, 2017). In transitions research, the object of inquiry, i.e., a social-technical, social-institutional, or social-ecological system, is undergoing a process of non-linear change from one system state of dynamic equilibrium to another. STR posits that "disruptive systemic change" appears within "a dominant and stable configuration in a societal system" to produce a shift towards sustainability. A key component of STR is a focus on multi-level dynamics (ibid.); higher- and lower-level transitions are taking place contemporaneously with and contribute to the transition at the level of analysis. I position my research within what Loorbach, Frantzeskaki, and Avelino (ibid. p., 610) would call the social-institutional perspective since my aim is to understand the "normativity, ambiguity and social construction" of "institutionalized cultures, structures, and practices" within regimes where transitions are occurring, i.e., the adoption and implementation of LCBs within VG to achieve a fossil-free society.

Grin, Rotmans, and Schot (2010, pp. 234–235) argue that transitions for sustainability will result in profound change as it disrupts established patterns and structures. Resistance will come from those whose power, values, and interest are dislodged in favor of new structures. Overcoming such resistance requires new constellations of actors to legitimize and empower each other within a sustainable development orientation (ibid.). They further argue that, from a governance perspective, transitions are a process of (re)structuration of systems which involves two iterative, reinforcing activities: actors' deliberate attempts to change social and physical structures of the current regime, and the adoption of practices that produce novel patterns of structural development (ibid.). I understand actors in VG as engaging in these (re)structuration processes since they have introduced programs and strategies with the explicit aim of achieving sustainability transitions (See Klimat 2030, no date c). Grin and colleagues (2010, p. 233) consider reflexivity as necessary for this (re)structurization. Agents must critically reflect not only on actions but the rationalizations of those actions. This reflexivity must consider the "flow of conduct" from past to future. Agents must consider the consequences of their actions in relation to structural conditions. This includes the potential for change in structural context through their own conduct and exogenous trends. Grin and colleagues (ibid.) refer to this process as reflexive monitoring. As indicated in the introduction, with this thesis, I endeavor to show that governmentality can be used as an approach to understanding this process of (re)structuration and enable reflexive monitoring in the governance of sustainability transitions by applying it to understand how LCBs intend to change governance practices in VG and thereby facilitate a sustainability transition.

3.2. Governmentality

Governmentality, as first articulated and elaborated by Michel Foucault, is rooted in the theories of discourse, knowledge, and power and the relationships between these (Dean, 2010; Lövbrand and Stripple, 2011; Bacchi and Goodwin, 2016; Luke, 2016). Governmentality studies are interested in the 'how' of governance and government. They ask by what means is governance to be accomplished and upon what rationalities and technologies does it depend on. Governmentality moves political inquiry beyond the analysis of interactions of citizens and state apparatuses to include structural and non-human sources of power (Luke, 2016). It shifts the focus of analysis to the multitude of rationalities and technologies that are brought to bear in the governance of people and their environment through strategic power relationships (Bacchi and Goodwin, 2016). This attention to rationalities of government seeks to probe how discourses create new 'truths' which guide and delimit acceptable action by agents who attempt to govern (ibid.). Lövbrand and Stripple (2011, p. 189) articulate that governmentality assumes "that the ways in which we represent reality are intimately linked to the ways in which it is acted upon and governed." Rose, O'Malley and Valverde (2006, p. 99) argue that governmentality studies consist of an "empirical mapping of governmental rationalities

and techniques" that "emphas[ize] the contingent and invented (and thus always mutable) nature of governmental thought and technique" by providing an analysis of "attempt[s] by those confronting certain social conditions to make sense of their environment, to imagine ways of improving the state of affairs, and to devise ways of achieving these ends."

According to Dean (2010), a 'rationality of government' is any attempt to think systematically about modifying human conduct towards specific ends. He argues that attempts to govern should be understood as an inherently moral act since there is an assumption of the rightness of the prescribed action. Government intends to make some actions virtuous and others not. Thus, government

"presume[s] a set of standards or norms of conduct by which actual behaviour can be judged, and which act as a kind of ideal towards which individuals and groups should strive. Such discussions also presume that it is possible to regulate and control that behaviour rationally, or at least deliberately, and that there are agents whose responsibility it is here to ensure that regulation occurs" (ibid., pp. 17–18).

The implication is that the act of governance assumes that human behavior is moldable through forms of self-government, whereby governed individuals choose to conform their behavior towards the standards set through the act of governing, or disciplinary force. Thus, human actors are recognized as having agency and freedom, but it is relational and contingent upon any number of constructed governing 'identities' or 'subjectivities' that arise from collective thought (ibid.). In this way, human freedom and agency are had in relation to institutional and structural systems of thinking and doing (Rose, O'Malley and Valverde, 2006).

Dean further argues that such rationalities of government are constructed from the wide array of "expertise, vocabulary, theories, ideas, philosophies and other forms of knowledge that are given and available to us" (ibid., p. 25). These amalgamations of knowledges are termed 'mentalities.' Mentalities of government are broad, often intermeshed and interdependent, ways of thinking. I associate the relationship between these two concepts of rationalities and mentalities of government with that of bricolage, which Cleaver and De Koning (2015) describe as a dynamic process by which people draw upon already existing institutional arrangements and re-arrange them to address contemporary challenges. What is meant by institutional arrangements is expansive, including "rules, practices, norms and relationships" (ibid., p. 4). Applying this understanding, a particular rationality of government is a bricolage arrangement of more diffuse mentalities of government.

A common starting point from which to begin an analysis of government is when governing practices, 'regimes of practices', are problematized by actors who are interested in their reform by introducing new 'programs of conduct' (Dean, 2010). These 'programs of conduct' are not comprehensive, in that they are modifications, rather than complete substitutions, of governing practices. More often than not they are drawn from the same underlying 'mentalities of government' which the to-be-reformed practices of government were also drawn. Instead, programs of conduct intend to turn a regime of practices towards new ends often while employing new means. I consider regimes of practices to be 'applied rationalities' in that they consist of the 'things done' in the act of governance. Within the notion of 'things done' can the aspect of government often referred to as 'technologies' be found. Technologies can be understood as the operationalization of governmental rationalities and include broadly practices, techniques, and tactics to achieve the envisioned ends of governance. In my study, I understand LCBs as a program of conduct that is introduced to problematize and modify the current governance approaches, regimes of practices, of the organizations where they are adopted. As such, LCBs constitute their own particular arrangement of rationalities and technologies that seek to change how governance is practiced within, and even between, the multitude of entities in VG.

3.2.1. Analytics of Government

The overarching analytical framework I have adopted as a methodology to guide this study is what Dean (2010) calls an 'analytics of government'. "The analysis of government is concerned with

thought as it becomes linked to and is embedded in technical means for the shaping and reshaping of conduct and in practices and institutions" (ibid., p. 27). The key assumption of this analytical approach is that the means by which we govern cannot be separated from conceptions of how to govern. For example, as illustrated by Paterson and Stripple (2012), the unit of measurement 'tCO2e' cannot be neatly separated from the concept of the Global Warming Potential; and the Global Warming Potential was only made actionable by the construction of the 'tCO2e.' The construction of 'tCO2e' as a technology for government of GHG emissions made it possible to create carbon markets as a 'regime of practices of government.'

An analytics of government is concerned with understanding the how of governance. It seeks to "understand how different locales are constituted as authoritative and powerful, how different agents are assembled with specific powers, and how different domains are constituted as governable and administrable" (Dean, 2010, p. 40). To understand this 'how' of governance, Dean (ibid., p. 41) suggests that regimes of practices of government be examined along four axes. These four axes constitute irreducible aspects of how governance is accomplished; they assume each other and are interdependent. Before explaining these axes, I address a central concept around which an analytics of government takes shape.

Dean (ibid.), as well as Bacchi and Goodwin (2016), identify problematizations as a key way of understanding how government is accomplished. For Dean, problematizations can "call into question" the means or ends of government (2010, p. 38). Dean stresses that such problematizations take shape as particular programs of conduct that address particular regimes of practices of government, as explained previously. This questioning of the practices of government exposes how governmental rationalities and technologies within such a regime of practice function by positing alternative means of accomplishing government or goals of such practices. Problematizations indicate a perceived disjuncture or fracture in government. They can identify the limits of a set of practices in achieving its intended purposes or question those purposes themselves as appropriate ends for governance.

3.2.1.1. Fields of Visibility

Fields of visibility revolve around ordering who and what are to be regulated and towards what ends. Governing requires a problem or a goal to be visualized and perceptible. "These all make it possible to 'picture' who and what is to be governed, how relations of authority and obedience are constituted in space, how different locales and agents are to be connected with one another, what problems are to be solved and what objectives are to be sought" (ibid., p. 41). Dean explains that the "visual and spatial dimensions" (ibid., p. 41) of governance are critical to understanding the logic within a governmental practice. He suggests that particular attention should be paid to diagrams and graphs that are used to govern as these give insights into the 'how' of governance. Despite this attention to the literally visible, it should be understood that it is the logical ordering that is made 'visible' that is within the scope of analysis. The discursive constructions present within texts and how they create relationships that are perceptible in thought should not be neglected. In my analysis, I examine how LCBs make the problem of carbon emissions visible and governable.

3.2.1.2. Government as a Rational Activity

This axis analyzes and exposes the range of "thought, knowledge, expertise, strategies, means of calculation, or rationality [that] are employed in practices of governing" and "the forms of knowledge that arise from and inform the activity of governing" (ibid., p. 42). In other words, to examine what must be known in order to govern according to explicit programs of conduct. Dean supposes that practices of government are both informed by and give form to knowledges (ibid.). This is also true of LCBs, they are composed through the ordering of different knowledges, but this ordering also produces new ways of thinking through that ordering. This becomes more apparent when programs of conduct are contrasted with the regimes of practice they intend to reform. I endeavor to show what forms of knowledge are present within LCBs and how they contribute to the modification or

formation of knowledges.

3.2.1.3. Technologies and Practices, or the Technical Aspect of Government

In order for government to be accomplished, things must be done. It is not enough to simply state the desired end. These 'things' are the "mechanisms, procedures, instruments, tactics, techniques, technologies and vocabularies is authority constituted and rule accomplished" and "often impose limits over what it is possible to do" (ibid., p. 42). Paterson and Stripple (2012) describe how the imagining of global carbon markets as a concept to organize governance of GHGs in the atmosphere gave rise to the development of the carbon accounting techniques and practices used globally to measure national emissions under international governance regimes and domestically within national emissions reporting schemes. They argue that doing so led to the creation of units of measure, such as tCO_2e; exchange, various types of carbon credits; procedures for verification, such as certification programs; etc., enabled the commodification of carbon and thus generated the subjects, objects, and practices that became the 'carbon market.' In my analysis, I seek to reveal what technical means are necessitated by governance with LCBs.

3.2.1.4. Formation of Identities

This axis of analysis is concerned with revealing how regimes of practices and programs of conduct "elicit, promote, facilitate, foster and attribute various capacities, qualities, and statuses to particular agents," individual and collective, and are successful insomuch as those actors come to identify with said capacities, qualities and statuses (ibid., pp. 43–44). In this way, programs of conduct depend upon and operate through various subject positions that are intended to regulate the conduct of the governing and the governed. It examines the "forms of person, self and identity are presupposed by different practices of government" (ibid., p. 43). LCBs assume the existence of certain identities and promote the reproduction of those entities towards specific ends; I attempt to reveal what these are and their potential effects.

In summation, governmentality and the analytic of government suppose that regimes of practices of government are enacted through various rationalities and technologies preformed to achieve certain ends. Actors who seek to govern do so by drawing upon mentalities, rationalities, and technologies they think will achieve the intended ends. They do so within a situated context, the mentalities, rationalities, and technologies have histories and are present in thought and action. Actors seek to modify existing regimes of governmental practice for different reasons, e.g., greater efficiency, preferred outcomes, etc. As a result, interested actors problematize these practices, their incumbent rationalities and technologies, and introduce programs of conduct that seek the reform of such practices. In problematizing these regimes of practice, the introduced programs for conduct expose the various strategic relations of power that inhere within them; how subjects and objects of government are ordered and brought into relation to one another through knowledge and practice. The act of governing can be understood as having four, interdependent and co-constitutive dimensions that make government possible: fields of visibility, rational activity, technical components, identity formation.

As I explain within my methods, I take these four axes of government as the analytical framing by which I approached the empirical material I gathered during my study. In my approach, I borrowed from post-structuralist policy analysis, based on the work of Bacchi and Goodwin (2016). This analytical style is in large part based on Foucault's theories of discourse and governmentality and thus shares a kinship with governmentality studies and analytics of government. Such an approach does not seek to establish the knowledge gained through analysis as 'truth', but as a political act that disquiets the naturalized, assumed truths at work in practices of governance. This opens up ontological space for actors to envision new ways of knowing, being, and acting as potential alternatives to the status quo. This can then be connected to what Grin and colleagues (2010) refer to, in the sustainability transitions literature, as 'reflexive monitoring.'

3.3. A Governmentality Approach to Sustainability Transitions

As stated previously, sustainability transitions can be understood as a process of (re)structuration consisting of two iterative and reinforcing activities: actors' deliberate attempts to change social and physical structures of the current regime, and the adoption of practices that produce novel patterns of structural development (Grin, Rotmans and Schot, 2010). This process is only possible if actors engage in reflexive monitoring. Within governmentality, actors are understood as problematizing governance by introducing new programs of conduct to modify that governance according to a new or differently ordered assemblage of rationalities and technologies that make governance possible. These new programs of conduct are not created *ex nihilo*, they are drawn from already existing regimes of practices and mentalities of government that permeate throughout the system in transition. They can be found in exogeneous trends, structure, and practices within the system in transition. To combine these two theoretical approaches, I offer the following: an analytics of government has the (re)structuration of social-institutional/technical/ecological systems as its object of study and can serve as a means of reflexive monitoring by making actors' 'flow of conduct' visible, revealing how their rationalizations become embedded in practices that make governance possible.

The purpose of applying a governmentality approach to sustainability transitions by conducting an analytics of government, in my case, is to understand how the introduction of LCBs contributes to the (re)structuration of governing practices and the current governance regimes in VG. The intention is to enable critical reflection upon, as well as identify limitations and potentially negative consequences from, certain programs of conduct inherent in policy (Bacchi and Goodwin, 2016). As asserted by Dean,

"By making explicit the forms of rationality and thought that inhere in regimes of practices…an analytics of government can remove the taken-for-granted character of these practices. The point of doing this is not to make the transformation of these practices appear inevitable or easier, but to open the space in which to think about how it is possible to do things in a different fashion" (Dean, 2010, p. 48).

and that

"the enhanced capacity for reflecting on how we govern others and ourselves makes it possible to adopt an experimental attitude where we can test the limits of our governmental rationalities…and thus investigate how we might think in different ways about the action on the actions of self and others." (ibid., p. 50)

I correlate this process to Grin and colleagues' (2010, p. 233) "reflexive monitoring" and "examination of the flow of conduct" they argue can enable the (re)structuration of the dominant societal system in question towards sustainable development. To restate, I conduct an analytics of government to examine how actors in VG are using LCBs to (re)structure practice of governance to make climate a governable domain and achieve sustainable development. To do so, I argue that LCBs should be understood as a problematization of government. As 'programs of conduct,' they seek to reform the 'regimes of practice' of governance within the municipalities and county government of VG and turn it to a specific end, the limiting of carbon emissions to a specified amount within the county by a specific date. Thus, the current 'regime of practices,' i.e., approaches to climate governance, in VG are being challenged by a new 'program of conduct,' LCBs, that intend to reform them in some way, which is what my research project explores.

4. Methods

4.1. Case Study

Franklin and Blyton (2011) discuss the use of case studies in sustainability research and argue that case studies allow researchers to rely upon a variety of data sources and set them in relation to one another around a common phenomenon. Sustainability research is often concerned with the social, as sustainability is ultimately about how humans interact with and perceive their environment (Franklin and Blyton, 2011). Case studies are particularly useful in situations where the phenomenon that is being researched is not easily separated from its context (Yin, 2009). Case studies are typically guided by research questions concerned with the 'how' or 'why' of ongoing events (Franklin and Blyton, 2011). My research examines LCBs, the phenomenon, in VG, the context. My analytical framework, an analytics of government, centers around 'how' questions of governance. Both these reasons demonstrate the utility of adopting a case study approach. Furthermore, that the VG LCBs are developing in relation to each other leads to the reasoning that they should be treated together to more fully understand how they contribute to the sustainability transition in VG as a governance tool, both as intention and in actuality.

4.1.1. A Brief Description of the Study Area

In 2017 VGR and VGL launched *Climate 2030 - Västra Götaland in Transition* as a mobilization platform for collaboration and coordination between diverse actors within the county, aimed at achieving a "climate-smart" society (Klimat 2030, no date c). This organization includes a variety of engagement and coordination strategies including a Climate Council, composed of leaders from various civil society sectors in VG; Municipal Climate Pledges, a series of twenty measures that municipalities can voluntarily adopt as emissions mitigation strategies; a Signatories page where organizations can evidence a commitment to the goals of Climate 2030; as well as specified focus areas and a strategic approach to transformation.

Forty-eight of forty-nine municipalities within VG have adopted at least one Climate Pledge and seven have adopted Climate Pledge 18 which requires that "the municipality shall have a politically determined plan or strategy for yearly emissions reductions within the territory of the municipality in line with their own or VGR's carbon budget with an emissions reductions pathway of 16% per year" (Klimat 2030, no date b). VGR itself, via the county council, adopted its LCB on January 26th, 2021 (VGR, 2021). VGR provided support for CCL's research that led to the production of the CCL-LCB framework in 2019 ('Koldioxidbudgetprojekt för kommuner, regioner och län', no date).

Members of the Climate Council position themselves as "regional leaders" and "forerunners," with the responsibility to "remove obstacles" as well as "mobilize and motivate" to achieve "climate transformation," i.e. achieve a sustainability transition within the region (Klimat 2030, no date a). These actors are also interesting because they often operate in a cross-scale manner, from local to global, and hold institutionalized authority within their respective organizations, an authority that is recognized and legitimized by state actors through their participation in the Climate Council. As such, these individuals' discursive practices are likely to have a greater impact due to this structural and institutional positioning (Bacchi and Goodwin, 2016).

4.2. Semi-structured Interviews

Due to the recentness of the use of LCBs as a governance tool, there is a dearth of empirical material readily available to analyze and in particular within the case study area, VG. There are no published best practices, user guides, implementation strategies, or the like. The number of actors who have worked with LCBs with the intention of using them for governing is few. The few documents that do exist about LCBs in the county are focused on explaining the methodology of how they were calculated and organized. I found this insufficient for the purposes of my study since I intended to investigate how LCBs embed into practices of governance and not simply how LCBs themselves are

constructed. In order to gain access to additional information about LCBs as a governance tool, I engaged in semi-structured interviews. Climate 2030 served as a relevant and convenient entry point into the study area. Potential interviewees were then contacted based on their participation in certain platforms within this initiative, namely the Climate Council and signatories of the Municipal Climate Pledges, Pledge 18. As voluntary, active participants, these organizations demonstrate that they are engaged in practices of climate governance.

As of the publication of my research, seven municipalities within VG are signatories to Pledge 18 of the Municipal Climate Pledge program. Pledge 18 represents a commitment by the municipality to adopt a strategy for GHG emissions reductions based upon their own or VGR's LCB, and a reduction target of 16% per year (Klimat 2030, no date b). I contacted each of these signatory municipalities and conducted interviews with five representatives who confirmed that they were knowledgeable of the organizations' efforts of implementing an LCB. These interviewees were from Trollhättan, Falköping, and Herrljunga, as well as VGR. Trollhättan officially adopted an LCB on November 23rd, 2020 (Trollhättans Stad, 2020a), VGR in January 2021, and the others have committed to adopting an LCB this year. Only VGR and Trollhättan have produced methodological documents supporting this decision (Anderson *et al.*, 2019b; Trollhättans Stad, 2020b). My final interview was with a representative from Stena AB, an organization that is currently participating in the Climate Council. Each of these interviewees requested to remain anonymous with the exception of the interviewee from VGR, Lise Nordin, who requested that she be cited by name when utilizing excerpts from her interview.

Semi-structured interviewing is among the most common methods of data collection within the social sciences (Leavy, 2014, p. 277). Within a constructivist approach, it is flexible and versatile, allowing the researcher to (co)produce information in collaboration with the interviewee (ibid., p. 282). I chose not to use a strict interview guide and instead chose to focus the interviews towards exploring LCBs with the interviewees by promoting responses that would give insight into the four analytical categories that structure my methodological approach. I had loose formulations of questions that were based upon suggestions by Dean (2010), but these were always adapted *ad hoc* during the interview in response to the respondent. All interviews were individual and conducted via video conferencing. These interviews were recorded and transcribed to treat them as texts for analysis. The resultant texts were analyzed along each of the 'four axes of government' described previously. Regrettably, my interview with a representative from Falköping was not recorded correctly and I was forced to rely on my, admittedly sparse, notes to create a summary after the interview was concluded. As such, I was unable to utilize it in my analysis except to a limited extent. I have used the material gained from that interview to give support to statements made by other interviewees.

I approached the interviews utilizing a method known as Post-structural Interview Analysis (PIA) (Bacchi and Goodwin, 2016). Utilizing such an approach means politicizing the personhood of the interviewee by treating interviewees as subjects in a process of 'becoming' through engaging in various practices. In such a setting, interviews become an attempt to understand, in my case, how LCBs produce subjects, both governing and to be governed, and objects to be governed by making certain things appear as self-evident. This technique assumes that interviews, as social practices, are political in nature and that there is no objective truth to which either the interviewee, as an autonomous, rational, individual with special knowledge, or the interviewer, as an impartial, analytical observer with special knowledge, can lay claim. As such, it could be considered as an active interview approach, since the role of the interviewer is acknowledged and the interview setting is considered as producing particular subjectivities and co-constructing knowledge, rather than as a simple means of conducting 'truth' from the interviewee via the interviewer (Leavy, 2014, p. 291). At times I actively challenged what was said by the interviewees or would rearticulate what they had offered to have them clarify their statements. In several interviews, I asked the interviewees to engage in thought experiments to explore potential new ways that LCBs could allow for the governance of the persistent problem of carbon emissions.

4.3. Text Analysis

Bacchi and Goodwin (2016) suggest that policy analysis is best begun through an examination of policy documents. These documents constitute a 'program of conduct' that seeks to frame certain actions as acceptable and moral (Bacchi and Goodwin, 2016). Given the general lack of policy documents on LCBs available, my analysis takes my interview transcripts as the starting point. In line with PIA, I treat these transcripts as texts for analysis. I coded each transcript using the 'four axes of government' as categories of analysis. Each axis, as explained above, has some specific concepts with which it is associated. For example, when an interviewee described a procedure to which an LCB is related, it was marked with the code for 'Technologies and Practices.' If an interviewee described specific expertise which was necessary to understand or implement an LCB it was coded with 'Knowledges,' and so on. Organizing the interviewees' statements thematically around these four axes facilitated the presentation of the results of the interviews in a way that more clearly showed how the interviewees' accounts revealed how LCBs seek to govern in VG. Organizing the interview questions around these axes and later coding them with them allowed me to preserve conceptual clarity in my analysis.

5. Analysis

My research seeks to address how LCBs reform governmental practices within VG and expose possibilities and limitations for their use in governing the climate. As described in the methodology section, an analytics of government can help to reveal the 'how' of governance. Below I present the results of my interviews by following the 'four axes of government' described within the theory section before providing a summary of their interconnection into a more holistic picture of how LCBs govern in VG. A reintegration of the findings presented below into such a summary is necessary since the four axes, or dimensions, of government, although distinguishable as aspects of governance that illuminate how government is accomplished, are interrelated, co-dependent, and mutually assuming, meaning that a complete separation for analysis is not possible nor fruitful.

5.1. Fields of Visibility in LCBs

As a reminder, this axis seeks to expose how people and things are to be governed in relation to each other to meet particular ends. The fields of visibility presented below are not wholly separate, they often intersect, but help to illustrate different aspects of how LCBs construct climate as a governable sphere.

5.1.1. Climate Nearness

One way that LCBs visualize and produce the problem of carbon emissions is as a local rather than a global one. Though it may seem obvious, seeing as 'local' is one of the descriptors of the LCB concept, the local territorialization of carbon emissions is considered as enabling better climate governance by local governments. In this context I understand territorialization to mean "the use of space to control and regulate nature" (Whitehead *et al.*, 2007, p. 16).

"There are scientifically established methods that show, even if there are no absolute limits on anything, you can still see that there is a connection between the amount of carbon emissions we produce and what it is that happens generally with climate change. You can scale it down and look at various measures and see how they affect carbon emissions. There is a clear 'red-thread' between those little various measures and a fairly abstract future." – Interviewee from Herrljunga

The Herrljunga interviewee stressed the potential utility of having a measurable pool of resources against which to compare and discuss various policy measures intended to create emissions reductions in relation to an "abstract future" and hypothesized that policy decisions could then be followed up by monitoring emissions statistics. This interviewee described that quantitative evaluations, comparison, and follow-up of a policy measure, would be made possible by an LCB since it provides a context and boundaries in relation to which such evaluations could take place. This makes the LCB a "concrete tool" for climate governance. While comparing these processes to the economic budgeting done within the municipality, the interviewee claims that an LCB creates similar logic because of its ability to set a "frame" around an "emissions resource." The interviewee suggested that such boundaries are what make such comparisons, and also prioritization, possible. The interviewee further explained that numerical descriptions of the climate, or future climates, are more relatable to actors within government since they often work with numerical comparisons, especially economic ones within budgeting processes.

Lise Nordin of VGR also made this connection during our interview, and when discussing how actors in VGR had been characterizing the LCB described it thus:

"[The Chairperson of the Environmental Committee] wants the economic framework to be the inspiration for how we should work with the carbon budget. That it should be the same way of thinking that we have limitations. We have this much emissions or this much money, and then we have the choice of how to use it.

It's very concrete. It's not just having a policy, it's a budget. You need to follow a budget. So, I think

that the choice of word carbon 'budget' is wise. Also, I find that the thought is the same; the same thing is that you have a limit. You have a roof, limitation, on how much you have. You cannot, with wishful thinking, decide that you have more emissions or more money. But you have a limitation, and you need to follow that."

The strong association of an LCB with an economic budget is explored more later in the context of practices of governance, but the idea featured so prominently in the interviews, especially in connection to the idea of establishing limits, that they cannot be neatly separated. This was exemplified in a response given by the Herrljunga interviewee who provided an exceptionally clear description of this phenomenon:

"The economic budget is constantly present in municipal administration. It gives, in some sense, absolute limits to what we can do. Therefore, everything that we do must conform to it. It has to be comprehensible when you make a decision: what are the consequences in relation to the absolute limits we have? The economic budget is also near-term, from year to year. That makes it very clear, and the limits are very clear as well. Even though it is said that 'the climate is an absolute limit for humanity' it is so large and distant and far in the future. So, this is a way to connect to and gain an understanding of what that actually means. And also to make it reconcilable. The economic limits define a boundary and connection between the administrative areas of the municipality. Then one can weigh measures for the climate against efforts in healthcare, or whatever the case may be, that are more near-term. It becomes a way to relate things to each other, that thing should be comparable. Since the resources are finite and often very limited compared to what we might like to do, both emissions resources, or whatever you might call them, and economic resources, one must make hard priorities. So then one needs something that can make different decisions comparable, relatable, to one another."

Despite questioning the feasibility of treating LCBs in the same manner as a municipal budget, the connection between 'limits' and 'budgets' remains strong. The interviewee from Trollhättan articulated the situation thus:

"We calculate how much carbon dioxide we have left before we reach the Paris goal. And it's just the volume, a roof, a limit for our- and it's not like an economic budget and we can't use carbon in the same way we do economics, because we have the [economic] numbers every day and we have the carbon dioxide numbers at a 1 1/2-year latency and just geographical values and not the values for more consumption. So, I was clear, we have this budget and it's just a limitation. It's just some science limitation and rule. And so, we reformulated; the whole objective for me was to make a carbon dioxide budget. And what I delivered to the politicians was a goal that was based on carbon dioxide budgets. So that's what we have today. We have a carbon dioxide goal. It says that we shall not, in the graphical area of Trollhättan, we should not release more that such-and-such amount."

The Falköping interviewee also commented on the necessity of territorializing carbon emissions since governmental bodies, i.e., municipalities and regions, act over geographical areas and its authorities are related to this jurisdiction.

In addition to making climate governance more directly actionable by governments, my interview with Stena AB revealed another important way that localization and territorialization of carbon emissions are related to making the abstract notions of global climate change manageable. When I asked about what makes LCBs useful as a way of seeing the carbon emissions problem, the respondent answered:

"I think one way is just that it's tried to make it tangible and putting it closer as an individual. It's something big and rather abstract to think of 'world global emissions' and 'how much we need to cut our emissions globally' but breaking it down to a smaller area, local area, that's closer to where I live; that's a way to make it more personal and thereby, perhaps, state the urgency and make people wanting to fill in and work to towards that."

The Stena AB interviewee also suggested that an LCB's capacity to connect the individual to global processes would increase "ownership" and "buy-in" by private actors to achieve emissions reduction goals. Territorialization implies ownership; territory cannot be had without a claim of authority to control. Localization into a preexisting category of space, VG, brings the abstract concept of global climate change into relation with systems of measurement and control within local and national state apparats (see Whitehead *et al.*, 2007; Rice, 2010).

5.1.2. Climate Urgency

LCBs make the challenge of emissions reduction urgent. As the territorialization and localization of emissions in LCBs focus action in space from the global towards the local, the mitigation pathway produced by the emissions reductions goals within an LCB focus action in time towards the present and near future. Respondents exposed this visibility with the following statements:

"I think it's good to have a goal that's actually in the line of Paris Agreement and not just 'we're gonna limit' or 'we're gonna be carbon neutral in 2040 or 35 or 30,' but we have a goal that says that we need to do stuff now. That's the difference. If you have a goal that says that 'we're gonna lower our emissions with 80% to 2030' we can still be going on the closest years and then we have a bigger crisis. ... A carbon budget shows us how emergent the situation is." – Interviewee from Trollhättan

"We realized, after working with this topic for a while, there is quite a big difference between our earlier climate goals and carbon budget, and the big difference that we have discussed is that the carbon budget shows us both the relevance to the Paris Agreement, to see that our work is in line or not in line with the Paris Agreement, but also that it helps to show how we need to reduce emissions now, here and now, and not later." – Lise Nordin, VGR

"But the carbon budget has really shown that we do not have time to wait to do activities to reduce emissions. We need to start here and now. And the carbon budget gives us that. The stress that if we do not reduce emissions this year, we will for next year have a new number, new figures that that shows that we need to reduce more. So, I would say the biggest difference for us to use carbon budget is that: the time perspective. We cannot wait." – Lise Nordin, VGR

During my interview with Nordin, we were able to discuss the role that visualizing urgency plays in stimulating action for emissions reductions. After probing further about the role of the mitigation pathway constructed by the LCB in visualizing the emissions problem, Nordin commented that she, even with significant experience working with environmental issues, had a personal realization of the acuteness of time in mitigating cumulative emissions when studying the LCB. She believes that there are still many within her organization that still have not perceived the effect that delayed mitigation action will have on achieving reduction targets. She felt that the LCB mitigation pathway was "mind-blowing" as a "new perspective" that demanded a shift in current governance approaches to emissions reductions away from "hoping for technology development or other things happening in the future" towards actions to mitigate emissions "now, here and now, and not later." Nordin further elaborated that the compounding effect of cumulative emissions on reduction targets year to year helps to make acting for emissions reductions urgent. The importance of this visualization was also mentioned during my interview with an individual working within the municipality of Falköping who stated that the emissions mitigations pathways based on the LCBs helped politicians see the urgency in taking action for mitigation.

The urgency produced in the way LCBs create a field of visibility for the government of carbon emissions strikes me as being less about climate change and its impacts per se and more about recognizing the scarcity of available emissions resources on which society depends. Though the LCB mitigation pathway does indicate how quickly we will reach a specified temperature threshold by our continuing emissions, what it more strongly indicates is the contrast between current, ravenous consumption of emissions resources in relation to the finite quantity available before that target is reached. Recognizing the scarcity of critically important resources is a necessary part of making a

resource an object of concern for the state, whose interest is in securitizing access to resources (Whitehead *et al.*, 2007, pp. 5–8). LCBs thus enable actors to perceive and act on the urgency of climate change directly by applying the techniques of carbon accounting to territorial emissions in relation to a finite number of 'emissions resources' within a defined 'emissions space,' to manage the consumption of such resources utilizing said techniques. In this way, LCBs make the urgency of climate change calculable and, in theory, governable. It could be said that the urgency of climate change is encoded in LCBs and translated into a 'language,' i.e., carbon accounting, that government officials can understand and use to act to govern climate.

5.1.3. 'Emissions Resources'

While interviewing with the respondent from Herrljunga, having listened to the description of the similarities of economic budgets and carbon budgets in setting limits that made prioritizations possible, I asked if there were other types of resources that the municipality manages that could be related to an LCB's 'emissions resource area' and offered municipal water services as a potential example. The interviewee offered the following response:

"Carbon budgets make it comprehensible that, even here, we have limited resources. We have 'this amount' of emission to create and it follows that we place those emissions in the right place, and it follows that we safeguard those resources so that we use them as effectively as possible, just as with an economic budget or when it comes to potable water resources. That we take care of them, so they are sustainable over a long time."

The interviewee emphasized that the sustainability of water and emissions resources depends on management and planning now and in anticipation of future development. Failure to do so could leave residents without the necessary resources for a functional society. The interviewee described discussions with politicians about the LCB as leading to realizations of the acuteness of the climate issue and the Paris Agreement. The steep mitigation pathway established through the LCB as the goal for yearly emissions reductions caused politicians to consider the precariousness of continuing to "wait for someone else to do something or that technological development will solve this."

"It gives a capacity to act, even if you set a boundary on things. So, by making climate change connected to this time and this place, in some way, one also gives a mandate to politicians to react in some fashion. Shows them that, yes, you can, by making different decisions, affect the outcome in the future. It isn't something that we can cross-our-fingers that it will be resolved but that you have the possibility to affect what will happen."

At the end of the Herrljunga interview, I asked the respondent about two of the phrases they had used earlier, 'emissions resources' and 'emissions space,' and why that seemed an appropriate way of describing LCBs. They answered,

"That image I have created for myself as I have gained a greater and greater understanding of the thinking behind carbon budgets. That we have limited space. One sees that it is the 'accumulated emissions' that are important. And that creates, in some way, a ceiling, a frame, for 'this much we can emit.' And as quickly as one has a frame for how much one can emit, then one must, in some way, see it as a finite resource. ... And that is, I think, what carbon budgets contribute to the thought pattern and to understanding that it is not about 'by a particular year we have ceased emitting,' but that 'for all time we have a certain space to move within.' That makes what we do today more relevant."

I suggested the possibility of conceptualizing LCBs as creating 'emissions resources' and the applicability of commons management approaches with Lise Nordin, VGR, as well. She was responsive to the idea and recollected that research on this subject suggests that people are more willing to change behaviors if they understand how their actions contribute to resource use and that lifestyle changes become possible if they feel that they are contributing to common goals and that the goals are fair. She explained that this was an important reason for adopting the CCL framework

as-is and inviting all the municipalities within VG to adopt LCBs based on it. “And I would say that the carbon budget has, so far, worked that way in our region because it is more obvious for everyone that it is a limited resource.” Nordin suggests that this prompts self-problematization, that actors ask themselves “how big is the part of that resource that we can take, what is our fair part?” Establishing a common approach to climate governance across VG with LCBs is “a way of seeing our part in the big picture and that gives motivation. I think it gives responsibility but also motivation.” Fairness was also broached in my conversation with the individual from Stena AB. When asking about LCBs and how that might affect the company’s practices, the reply touched on similar themes discussed by Lise Nordin. “In one way it facilitates companies work to reduce their emissions because it becomes a sort of a peer-pressure among the local companies and those active in that region. And so that's in the best of senses.” I probed further and asked about how LCBs might be different than other governance tools. The interviewee discussed the importance of localizing climate impacts and action and how that can focus cooperation on a shared goal.

“Because the challenge ahead of us, when it comes to the climate and reducing our emissions, is huge and not something that just one person can do or just one company can do but we need to work together. So, having a carbon budget as a platform to engage and start up different partnerships and collaborations and how we can use each other, both in terms of expertise and knowledge and previous experiences, but also having each other projects and ‘how can we fit into each other business models’ and I think those kinds of cooperation could be positive things that come out from the local carbon budgets.”

Recognizing fairness as an aspect of LCB governance reveals that actors perceive LCBs as producing scarce emissions resources that require distribution amongst actors in the region according to certain principles. This can be seen as a reproduction and localization of the calculations and negotiations present in international conventions, i.e., the Paris Agreement, and the decisions made by CCL to determine the LCBs for VG (See Anderson *et al.*, 2019).

5.1.4. In the Shadows of an LCB

It is relevant to identify not only how LCBs create fields of visibility wherein governance can occur, but also in what way their constructions may obscure other ways of seeing. My discussion with the interviewee from Stena AB helped to illuminate aspects of governance that are hidden by the way that LCBs produce the problem of emissions. One challenge to embracing an LCB from this company’s perspective has to do with the ability to surmount structural barriers. This relates to the discrepancy between an LCBs local view and a globalized shipping trade and how the LCBs generalize an emissions reduction target for the whole territory. The interviewee felt that the soft approach to LCBs that focus on voluntary cooperation, as opposed to regulation, enabled global companies to have strategic maneuverability in how they engage with the framework. Regulation, or legislation, in local or regional frameworks are seen as

“put[ting] the competition out of order. ...And that's something that companies don't like. You want to compete on fair terms. ... whenever you put regional or national aspects in and you're operating in a global field, or even if you put in local things and you're operating on a national field, that sort of put a hinder into the competition.”

The generalized emissions reduction target produced by an LCB does not account for any individual entity’s historical reductions of emissions nor relative ability to achieve future reductions. This is a problem for a company like Stena AB which sees its shipping operations as ill-placed to meet the challenge of LCBs' steep reductions pathways. There are structural and technological barriers that prevent decarbonization in that industry that are not immediately visible with LCBs.

5.2. LCBs as a Rational Activity

Here I examine how LCBs inform government as a rational activity by analyzing what types of

knowledges and expertise LCBs depend on and contribute to.

5.2.1. LCBs as Specialist Knowledge

When discussing the adoption of the LCB as a goal, the Trollhättan interviewee expressed concerns about a lack of know-how in the application of such a tool within the organization.

"We don't have a plan how to manage that. ... I'm still confused about how we're going to manage to reach our goals. ... We do lots of stuff and we could do more and there's still some stuff we don't know how to solve, I would say. ... Sometimes I think we're just not aware of what we should do- that we, at one time, think that we want to do a lot, and then in another area, we just keep on doing as we have always done and it's very easy to get stuck in the small changes."

"When we have these political goals in the back and know that it's not only that they've taken the goal, they ask for it and they really want to do stuff, but they don't know how to do stuff and we have to always come up with ideas how to do what [they] want to do. And I think the goal is, even if you don't have a plan for how to solve things, we have a really good argument. And people listen to me actually, and that's nice, but I can't be everywhere and remind everybody and be knowing what's happening all around town."

When discussing how the LCB was compiled, the interviewee expressed that such a process was "straightforward" when relying on the same data sources that were used by Anderson and colleagues to develop the original CCL LCB framework, the same one which was adopted by VGR and integrated into the Climate 2030 Municipal Pledge program. Relying on climate experts was identified by several interviewees as being important in establishing the LCBs as relevant policy instruments. The Trollhättan interviewee helped to clarify how this knowledge was constructed through various actors and institutions. Emissions data is collected, measured, calculated, and analyzed, in large part, by the Swedish Meteorological and Hydrological Institute (SMHI) using "big, complicated models" and processes. It is then complied and organized by the Regional Development and Collaboration in the work with Sweden's environmental goals (known by the acronym RUS in Swedish) to reflect territorial emissions. This data was then used by the researchers at CCL and combined with statistical methods to interpret qualitative aspects of the Paris Agreement to create the CCL LCB framework. It is clear that LCBs depend on a complex and interconnected array of expert and technical knowledges, practices and technologies for the measurement of the environment, generally the same as those used in the wider field of carbon accounting.

I also discussed relevant knowledges and expertise with Lise Nordin, VGR. Nordin explained that the decision to adopt the CCL LCB 'as-is' by VGR was a strategic one in that it would allow officials to rely on the expertise of CCL as justification for the particularities of the LCB rather than to open up to extensive political debates about how the LCB should be composed. A second factor was the desire to use a similar framework across the county to allow for greater comparability between the municipalities and the county. I asked Nordin about who has 'control' or is considered knowledgeable about the underlying concepts of the LCB. She responded that "our politicians, they have only met the report itself from Uppsala University. So, they have never had any contact with any of the researchers in Uppsala. That has only been me, I realize. So, they're all believing in me." She discussed some of the debates raised after the adoption of VGR's LCB by various stakeholders about particular aspects of the LCB, such as not accounting for carbon capture and storage technology development and only calculating CO_2 and not other GHGs. She said in connection to these concerns, "it's obvious to me that we very strongly been relying on a framework from Uppsala University, so

in that, there is a lot of power."

My interview with Stena AB also revealed ways that LCBs function as specialist knowledge. The interviewee expressed that "we had hardly come across local carbon budgets at all" until Stena AB was invited to participate in Climate 2030's Climate Council. The interviewee identified VGR and VGL as having "knowledge relating to emissions and the different kind of things that we need to do, hard expertise on climate change." The interviewee described that, in many ways, an LCB does not directly facilitate climate action by large, global companies, and that the broader initiative of Climate 2030 provided more opportunity for engagement with the county's climate governance. It was further expressed that the concept of LCBs may proliferate among officials in various governments within the county, but likely remain unknown to laymen and may be of little practical use in managing how companies conduct their business.

5.2.2. Knowledge Networks

Four of the interviewees discussed the importance of a knowledge network between the municipalities' and county's environmental and sustainability strategists to disseminate relevant information about LCBs around the county. They described how the ability to rely upon each other's knowledge was important to facilitating the adoption and implementation of LCBs since municipalities often face a challenge of limited expertise internally; the number of persons with sufficient background knowledge to understand the science of carbon budgets is limited. An LCB knowledge network enables these strategists to gain access to additional and more specific expertise that can supplement their own. Climate 2030 plays an important role in this process. In Falköping, the municipality is currently redeveloping its climate strategy, and the Municipal Pledges, and the Climate 2030 approach generally, provided a convenient platform around which to begin negotiations and planning. This included Falköping's commitment to adopt Municipal Pledge 18.

5.3. Technologies and Practices of LCBs

In this sub-section, I will present an analysis of how the respondents have understood LCBs are or could be connected to practices for governance through policy and what techniques are required or made possible by their use. I use 'connection' since it reflects the varied levels of institutionalization of LCBs in VG within practices for governing.

5.3.1. LCBs and Economic Budgets

VGR's LCB is explicitly connected through policy to two strategic areas, the economic budget, presented immediately below, and the regional development plan, which I present later.

"We have written in the decision of the carbon budget that the economical budget shall address what activities need to be prioritized in order to reach the carbon budget." – Lise Nordin, VGR

Though officials are now required to consider the LCB in VGR in connection to economic budgeting, Nordin expressed uncertainty about what that process will entail in practice. She spoke about the experimental character of implementing an LCB in this way as a "frontrunner," trying things that have not been done before. She related an interaction with a member of the political staff who was working with the economic budget and had asked her "what does this mean?" She did not tell me her direct response, but what she said afterward was, "we don't know that yet; how they will interpret that." When I asked why LCBs should be connected to the economic budget she responded in the following way:

"Because we need them to work together. Our budget is this much money, so whether that money is

being put into activities increasing or reducing emissions will make all the difference whether we reach the carbon budget. So, if the economic budget doesn't take the CO_2 emissions into consideration, we can never reach the goal. We believe that a couple of decisions that are being made within the economic budget are making it harder for us to reach the carbon budget."

She further explained that her understanding is that this connection is an attempt to introduce the "perspective that the economical budget needs to be in line with the climate work" yet the uncertainty about how that might be achieved beyond a simple demand that it be considered, remained. This uncertainty could be understood as revealing a lack of technologies within the current regime of practices for regional economic accounting that would enable LCBs to govern with these practices.

The Herrljunga interviewee also shared thoughts about the connection between these two types of budgets and why connecting them is useful. The relevant quote is found in the Fields of Visibility in LCBs sub-section above, however, its relevance merits a replication here.

"The economic budget is constantly present in municipal administration. It gives, in some sense, absolute limits to what we can do. Therefore, everything that we do must conform to it. It has to be comprehensible when you make a decision: what are the consequences in relation to the absolute limits we have? The economic budget is also near-term, from year to year. That makes it very clear, and the limits are very clear as well. Even though it is said that 'the climate is an absolute limit for humanity' it is so large and distant and far in the future. So, this is a way to connect to and gain an understanding of what that actually means. And also to make it reconcilable. The economic limits define a boundary and connection between the administrative areas of the municipality. Then one can weigh measures for the climate against efforts in healthcare, or whatever the case may be, that are more near-term. It becomes a way to relate things to each other, that thing should be comparable. Since the resources are finite and often very limited compared to what we might like to do, both emissions resources, or whatever you might call them, and economic resources, one must make hard priorities. So then one needs something that can make different decisions comparable, relatable, to one another."

This interviewee highlighted the central role that economic budgeting plays in municipal administration as a means of establishing firm limits around possible actions as well as connecting the work of the different administrative departments. The interviewee suggests that this tool, the economic budget, is a resource pool upon which all municipal actors must rely, and this shared resource demands the comparison and prioritization of alternative uses. Putting a numerical limit on emissions, as is done in LCBs, helps to maintain the logic of comparison and prioritization of suggested uses. Determining the 'emissions cost' of actions in relation to a finite carbon budget makes this possible and comprehensible by state actors. The Trollhättan interviewee also spoke about the central role of economic budgeting in municipal administration and identified it as "the main way of ruling" and that "if you keep your budget, then you can start to work with all the other goals," firmly establishing the economic budget as defining the limits of possible action. This is a useful illustration of how actors draw upon wider mentalities and rationalities of government when introducing new programs of conduct to reform governance practices. In this case, interviewees discussed how many actors within their local government drew on municipal and regional economic and fanatical accounting rationalities and practices to understand the LCBs in practice.

The interviewees from both Falköping and Trollhättan expressed doubts about the ability to effectively connect economic budgeting to LCBs in a way that would achieve the latter's ultimate objectives. Both expressed that there is interest among other actors within the municipalities in connecting the two types of budgets. Additionally, the Falköping interviewee said that climate issues were already considered during the municipality's quarterly budgeting meetings. The primary concern expressed by the Trollhättan interviewee about drawing too close a comparison between an LCB and an economic budget revolves around a lack of knowledge about the carbon impact or 'emissions costs' of proposed actions and therefore their comparability within economic decision-making:

"I think people hear about the carbon budget to think, 'oh, if people have a carbon budget they need to follow it as hard as they do an economic budget.' So, I think some people maybe haven't thought through it a lot and think that 'oh, if we have a carbon budget we're gonna solve the problem. That's sufficient, that we need to keep it as our economic budget,' and that's not how it works. Then you misunderstand the idea of a carbon budget because we don't have the carbon dioxide numbers. If we want to do that, you need to have the carbon dioxide emissions for every post in our economic budget. And we don't have that data and it's going to take too many resources and working time to be close to that- and then we already missed our goals. You know, it's impossible."

Lise Nordin, VGR, also made clear the importance of extending the application of an LCB beyond internal budgeting since emissions that are produced by the county government's activities, and therefore manageable in relation to the economic budget, are consist of only a relatively small portion of territorially measured emissions. She emphasized the need to gain broad stakeholder participation to achieve the goals set out by an LCB, a point made by all the interviewees.

5.3.2. LCBs and Yearly Reporting

Trollhättan and VGR have decided to make the emissions goal set by their corresponding LCBs as areas for monitoring and follow-up during yearly reporting processes undertaken by the municipality and county government, respectively. The interviewees from Herrljunga and Falköping anticipate that this will also happen in their respective municipalities, but no decision had been made as of our interviews.

In Trollhättan, the interviewee explained, the municipal yearly reports are based upon the 'Goal and Resource Plan' and that it is the responsibility of the sustainability strategists to assist other administrative departments in pursuing those goals, as well as monitoring, reporting, and follow-up. We did not discuss how the LCB might figure into these processes, but the interviewee expressed concerns about whether such an approach would make climate issues visible enough in the decision-making processes across the municipality.

In VGR, Lise Nordin related that the county Environmental Committee has been assigned the responsibility of following-up work with the LCB but that VGR has planned to establish an expert panel of researchers to "evaluate and give recommendations for all actors in VG" but that the specifics of the assignment have not been finalized. The intention is that this expert panel will produce yearly reports that are made publicly available and can contribute to achieving accountability for effective climate action.

5.3.3. LCBs and Development Planning

In VGR, the LCB has been implemented into the county's Regional Development Strategy (RDS), a policy document that is developed in collaboration with the municipalities. According to Lise Nordin, the RDS "shall use the carbon budget as a tool in its implementation" but was also concerned that such language provides little guidance and insight into exactly what will be done in practice. After describing the connection of the LCB to both the economic budget and RDS, she commented:

"I believe that the challenge is bigger than just deciding on these sentences, that they shall work together because we know that the carbon budget will set limitations on a lot of other activities. Thinking that thought through all the way will set quite a strict framework for all other activities, and I'm not sure if everyone is aware of the consequences. Well, no one is aware of the consequences because it is an analysis and discussion that needs to be had every year."

While interviewing the individual from Trollhättan I asked if there was an intention to connect the

LCB to processes beyond yearly reporting. The answer was tentative and did not explain how the LCB might be connected but reported that the municipal civil planning department had decided that "climate analysis" was to be made with each "detailed plan" for development projects.

The Falköping interviewee expressed that that municipality aimed to use the LCB to justify systemic changes, which I interpreted as relating to regional planning, that would make choosing less climate-impactful actions easier, rather than imposing direct regulations. The Herrljunga interviewee, while emphatically stating that this was only this individual's opinion on how the LCB should be used, suggested the following:

"What function the carbon budget will have is not decided yet, but if it is to have an effect, it must at least constitute a planning basis for every plan I should think. Both the municipality's general plan and when one decides strategies for other activities. Even how one manages school activities or what we do with our real estate affects the carbon budget. So, in some way, it needs to be present in the back of the mind, always."

5.4. LCBs and the Formation of Identities

The Formation of Identities axis highlights how practices of governance presuppose agents, individual and collective, with various capacities, attributes, and statuses in order to affect governance.

Perspectives offered during interviews highlighted the dependency of government actors on civil society and private actors to achieve politically determined mitigation goals, such as an LCB. While recognizing that municipalities and the county government do have vested powers that empower them to act to compel compliance to the emissions reduction goals determined by an LCB, the extent of the capacity of local governments to compel action to reduce emissions by individuals was often seen as being limited and mostly associated to the monopoly power of development planning.

"After all, we cannot force our citizens to reduce their emissions, at least only to a very limited extent. Instead, we have to trust that they also understand that this is something we need to do together. Then I think that a great, important point about carbon budgets, I have confidence that, not everyone, but a lot of people, see that this is an important issue, and a carbon budget will be a way for residents to be aware of the state of things right here in Herrljunga" -Herrljunga Interviewee

The interviewees all seemed to suggest that a primary way to use LCBs was as a communication tool that would prompt individual self-problematization and -governance by individuals within the relevant territory. When applied this way, LCBs assume and promote the need for an ecologically conscious citizen with a civic duty to reduce emissions, not because a sovereign authority demands it, but because one is a good member of society to achieve reductions. Alone LCBs do not provide specific enough information to allow individual entities, whether persons or organizations, to engage in a detailed or measured carbon accounting since they do not apportion individual budgets or quotas of carbon emissions, nor do they provide a list of 'emissions costs' for specific actions undermining the possibility of individuals preforming cost-benefit style decision-making in reference to an absolute limit.

Though LCBs are often understood as a way to encourage self-governance, they can also be understood as constructing identities of mutual dependence and responsibility for carbon emissions, since emissions are generalized across the territory and into a common mitigation reduction goal. Every actor, in every economic sector, public and private, is subject to the same overarching mitigation goal. Not only as individuals but as a collective entity, the county or municipality. LCBs create not only a defined space for a finite amount of emissions resources but space for cooperation and contestation of the distribution of those scarce resources. The problematization of carbon emissions through LCBs means that actors across society, within an LCB's corresponding territory, can enter into negotiation, or even conflict, to determine the allocation of those resources. Thus, LCBs become a site for politics and political action. As politically adopted goals, LCBs govern

through voters who must hold politicians accountable for success or failure in emissions mitigations. They also govern through citizens as members of a body politic who have a mutual duty to support common political goals.

"My hope is that, in part, people will question us in the municipality but also that they will see that this is something that we do together. That they will think, 'what can I do to contribute to fulfilling Herrljuna's goal of the carbon budget?' – Herrljunga Interviewee

"For people living in Västra Götaland, it can be used as a tool to as your politicians 'what do you do to reduce emissions in line of the Paris Agreement' to give it gives them a tool. It's quite- very clear, what needs to be done and it is easy to monitor. ... for the voters it will be easier for them to ask their politicians, 'what have you done?' to try and get the answers, 'Are you taking responsibility for the carbon budget?' – Lise Nordin, VGR

5.5. Re-integration of the Four Axes of Government

As the four axes, or dimensions, of government are co-constitutive and assume one another they must be understood in relation to each other in order to elucidate how LCBs seek to reform regimes of practice of government and make governance of the climate possible.

LCBs construct the problem of carbon emissions as a local, rather than a global problem. LCBs make visible, through the techniques of carbon accounting and inventory, a finite amount of collectively shared emissions resources and the distribution and consumption of these available resources in time, through its organization of mitigation pathways, to meet the needs of individuals and groups within their corresponding territory. Thus, climate change and atmospheric concentration of carbon are made present in time and space. By fixing emissions to the territory where they were produced, LCBs make climate change and mitigation challenges near, present, and immediate by assigning responsibility to the emissions producers as depleting their own 'emissions resources.' Causal complexity is thus simplified; an LCB says, in effect, 'you produced the emissions, and they contribute directly to climate change here, in your county/municipality; your budgeted emissions space is measurable and exhaustible.' The responsibility is collective since the LCB reveals no attribution of emission to specific actors, but rather to sectors of activity where actors are involved. This collective responsibility gives a mandate for political action to reduce emissions and suggests that each actor problematize their own conduct and that of others to reduce emissions in line with the LCB's mitigation pathway. A *local* carbon budget, as opposed to global, helps establish a political mandate for mitigation action since it re-frames abstract global climate change futures into local and collectivized climate impacts.

LCBs are highly dependent on expert knowledge, from the measurement, monitoring, and calculation of carbon emissions by expert national agencies, to the crafting of climate governance frameworks by researchers at the university, to the suggestions of implementation strategies by professional bureaucrats in local government. Actors working with LCBs see this expert knowledge as lending credibility to the approach; an example of policy guided by science. However, this also means that knowledge of how to 'effectively,' i.e., using technical and scientific knowledge and tools, govern according to an LCB is restricted to a small network of experts spread out within VG and linked to nodes like CCL and RUS. Even so, each of the interviewees revealed that there is substantial uncertainty in this implementation, from feeling that few actors understand the concept well enough to use it successfully to guide decision-making and even surrounding their own lack of capacity to implement an LCB into strategies to ensure success. LCBs in VG are part of a network of climate governance, instigated by VGR and VGL, that helps to, hypothetically, create an experimental and collaborative environment for actors to try new governance approaches with LCBs that will be comparable and relatable to each other. There seems to be substantial doubt about how to approach LCBs as a governance strategy and a concern over a lack of tools for accessible and centralized carbon footprint or climate impact information that could contribute to the currently implemented approaches.

The institutionalized practices of LCB governance in VG are currently limited to goal setting, monitoring, and follow-up by environmental specialists within local governments' yearly reports; problematizing economic budgeting by asking decision-makers to weigh 'emissions costs', as of yet undetermined, with financial costs; and problematizing development planning by asking decision-makers to explicitly consider the climate impact, as of yet undetermined, of development alternatives. These practices are still ill-defined and under-preformed meaning that they are likely to remain dynamic, subject to experimentation and uncertainty. Local actors are dependent on the centralization of knowledge about climate into networks and practices of GHG accounting predominantly practiced by actors within national state institutions, such as RUS, SMHI, the Swedish Environmental Protection Agency, and others who produce new understandings of nature in the attempt to quantify and simplify it to make it available in practices of territorialization, the regulation and control of spaces (See Whitehead *et al.*, 2007). Actors in VG depend on the processes of standardization, simplification, and commensuration of the climate and atmosphere into carbon accounting within their territories to make the climate into a governable domain (See Gupta *et al.*, 2012). As such, LCBs function within the paradigms of state-administrative techno-rationalism, perhaps unsurprising considering the origin of the concept of carbon budgets.

6. Discussion

The results section above presented the findings produced during five interviews that focused on understanding the 'how' of using LCBs for climate governance and sustainability transitions. The interviews, their analysis, and their presentation here were guided by the conceptual framework of an 'analytics of government' that allows researchers to examine "thought as it becomes linked to and is embedded in technical means for the shaping and reshaping of conduct and in practices and institutions" (Dean, 2010, p. 27). In the following section, I discuss my findings in relation to the wider literature before elaborating on some of the practical and theoretical implications of my research.

6.1. Findings in Connection to Literature

My research modifies Peters' (2018) claim that carbon budgets lack policy utility by examining how actors rationalize and practice LCBs to govern. Beyond using carbon budgets merely as an "elevator pitch to summarize the climate challenge in a few sentences and to explain the importance of net-zero emissions" (ibid., p. 380), policymakers in my case study felt it more useful to dispense with the uncertainty surrounding a particular "magic number that describes the mitigation challenge" (ibid., p. 380) and adopt such a number as a strategic goal and as a guide for decision-making in important governance processes. Research into local climate governance by Rice (2010) would also seem to run counter to the claims of Peters noted above. Indeed, Rice claims that "the production of carbon territories and territorial ordering of climate via carbon is a central way that states can exercise political power related to climate" (2010, p. 935). My research reveals how LCBs contribute to the territorialization of the climate through carbon by local state agents and institutions as a way of opening up ontological space in which governance can take place. In this way, my research expands upon understandings of rationalities and practices of territorialization as a necessary process of climate governance. Discussing the concept of territory, Elden suggests that territory should be understood as "the relation of the state to the emergence of a category of space" (2010, p. 810) that is a political technology that employs techniques for measuring and controlling land and terrain. I suggest that territory should be understood as a political *rationality,* that is operationalized through particular techniques of measure and control, as the concept itself is related to the rational ordering of people and their practices to govern categories of space toward certain ends. Under such a construction, LCBs act as a medium through which actors colonize a new category of space, a 'carbon territory' to borrow from Rice, with the local state's techniques of measure and control expanded into the atmosphere to achieve carbon emissions reductions.

Rice (2010) also suggests that the establishment of carbon territories by local state actors also encourages self-problematization and self-government to reduce carbon emission in line with politically established goals. My research agrees with this proposition as evidenced by interviewees' stated intentions that LCBs will do just that. However, my analysis suggests that LCBs also become a site of politics by producing a finite quantity of 'emissions resources' and introduce the issue of the distribution of scarce resources. No one entity can be considered as having sufficient means to control the distribution of this resource and therefore requires the participation of society to engage in negotiation and problem solving to manage this distribution. With LCBs, being "a good carbon citizen" (Rice, 2010, p. 935) moves beyond self-governance to mitigate emissions and into the politics of the government of others to resolve a collective action dilemma, where the immediate individual wants and needs, i.e. consumption of carbon-emitting resources, conflict with a societal need to mitigate climate change where benefits are not immediately accessible. At the heart of LCBs producing climate as near and urgent, and therefore amenable to political action, is the process of territorialization of carbon, whereby state actors attempt to "embed the abstract concept of climate change onto the urban environment and into city politics" (Rice, 2010, p. 934). Rice's (2010) investigation into climate governance in Seattle, Washington demonstrates the key role this process plays in making climate governable by state actors. Rice (ibid.) identifies several actions that make this possible: assigning GHGs to a local community, making the "material nature" of climate change visible to state institutions through measurement and inventory of GHGs, reproduction of the local

state's authorities into the established territory.

My findings also contest claims by Geden (2018) that the carbon budget concept is not actionable since policymakers have obviously found utility in the adoption and institutionalization of LCBs in several important ways. Geden also argues that policymakers have "an interest in continuing inconsistency" by "asking for ambitious mitigation pathways without implementing the knowledge presented" (ibid., p. 382). This claim does not seem to apply in my case. Actors in VG have largely sidestepped the uncertainties and nuances within the CCL LCB framework and neglected the political maneuverability offered by inconsistency in "climate policy talk" (ibid., p. 382). My research provides insights into how this seemingly exceptional behavior by policymakers can be explained. In VG, actors implementing LCBs emphasize the importance of science-based policy as a legitimizer of political action, so much so that officials in VGR adopted the CCL LCB framework 'as-is' in part to avoid protracted political discussion about such uncertainties and instead relied on the credibility of researchers as experts who made decisions about how to incorporate carbon budget uncertainties based on informed, scientific evidence. The need to maintain inconsistency in climate efforts may find itself in the realization that, according to several interviewees, officials may not grasp the extent of the implications that an LCB has for the transformation of society. As Lahn (2020b) suggests that carbon budgets introduce a question of distribution of the remaining budgeted emissions, a claim my research supports and expands on, local actors must grapple with how to manage such a distribution. Since LCBs themselves do not establish principles nor methods for the allocation of scarce emissions resources within the territory, municipal or regional, there remains a degree of uncertainty and inconsistency that would allow policymakers to capitalize on what I see as substantial political maneuverability within the negotiation of such a distribution. Distribution of resources among a population within a territory *is* politics, therefore LCBs are inherently political as they demand political action to resolve a problem of distribution and ensure the environmental security of the population (See Whitehead *et al.*, 2007).

The question of the politics of distribution forces me to consider how LCBs function as a means of defining a space for 'right' and 'moral' action. Prompted as well to think about carbon emissions mitigation as a question of 'fairness' described in the Paris Agreement in relation to global emissions, to Anderson *et al.* (2018) who adapted the Agreement into the CCL LCB framework for sub-national carbon budgets adopted by actors in VG, and reproduced by interviewees within this study, I recall how Dean (2010) describes governance as having a moral nature. My research illustrates this moral nature of government and describes how actors in VG associate LCBs with values and value judgments, often contested, in how the technical tools for accounting for carbon budgets should inform the apportionment of the remaining budget. How certain strategies and approaches of governance become 'virtuous' or moral is something that is considered by Paterson and Stripple (2012) as well. They argue that carbon markets are granted a 'virtuous' character since they are associated with action to combat climate change. I find a similar effect present in VG where LCBs, by relying on the authority of science and moral virtue of acting to mitigate climate change, become attractive as means for political actors to legitimize their action, or lack of action, on climate change.

To build on Lahn's (2020b) claim that carbon budgets introduce questions of resource distribution, my research confirms and expands upon it. As understood through my analysis, LCBs, and carbon budgets generally, create a finite amount of emissions resources that are to be shared and consumed within a carbon territory. The finitude of the resource is made urgent through representations of cumulative emissions in relation to a specified warming target in mitigation pathways. These mitigation pathways also represent the rapid consumption of now visible scarce emissions resources present within the carbon territory. The consequences of eliminating this resource and exceeding the budget have clear connections to the expected impacts of climate change and global warming. This connection shows how the depletion of the budget before successful decarbonization threatens the security and welfare of society and demands action to mitigate these potential harms.

Whitehead *et al.*'s (2007) work in explaining how nature is produced and brought into relation to the state for governance via the processes of centralization of knowledge about nature and

territorialization of nature are also exemplified within my research on LCBs in VG, which reveals the ways that LCBs depend on both processes to make climate governable. I find that LCBs' rely on a centralized nature, based on national and international practices for the measurement of the material nature of the climate, and the territorialization of nature via the extension of local state practices for the control of nature into a new categorical space, an 'emissions space' within the atmosphere as a 'carbon territory.' My research supports their claims and illustrates this process. As such, it agrees with the claim made by Lövbrand and Stripple (2006, p. 218) whose governmentality analysis of national carbon sinks demonstrates how government actors (re)territorialize the atmosphere and global carbon cycle using "modern technologies for controlling, modeling and measuring atmosphere-biosphere interactions" and suggest that the "territorial dimensions of environmental issues…are always in the making." I find that LCBs function in a similar way at local, sub-national scales to make climate legible and actionable to local actors within preexisting frameworks that allow them to act through already existing strategic power relations to manage and control the carbon territory.

6.2. Implications for Policy

Though LCBs establish a generalized emissions reduction goal for the entire territory, all emissions, even carbon emissions, are not equal. By this, I mean that there are different structural barriers to decarbonization present in different sectors where emissions are being produced. Policymakers and others must identify what structural barriers are present in their jurisdictions and make specific plans to remove them. As an example, in the case of Stena Shipping, described during my interview with the individual from Stena AB, there are currently no readily available carbon-neutral or -free fuel substitutes for their cargo ships. Until such a barrier is removed, emissions from such operations will only decline if the emissions generating actions are decreased; a proposition not likely to motivate shipping companies and likely to have serious social-economic consequences unpalatable to politically motivated actors. Therefore, policymakers should consider the possibility of increasing emissions reduction targets in areas, sectors, or industries where structural barriers are more easily overcome while attending to more challenging transition issues. Actors in sectors with major constraints to decarbonization may find themselves stuck in the 'tail-end' of the carbon budget, and even pushing past it, if efforts are not taken to actively restructure identified barriers to emissions reduction. Policymakers should also consider what should be done if these structural barriers cannot be overcome within the determined budget. Might aspects of economic production and distribution need to be reorganized if certain sectors cannot be decarbonized? How should that be accomplished? Addressing these issues may help improve the 'fairness' aspects of LCBs, moving from an oversimplified 'equal playing ground' to an equitable approach to emissions reductions that considers structural barriers to decarbonization. The focus should be on achieving an overall emissions reduction as a whole, county or municipality, rather than an individualized pursuit of the mitigation pathway.

Despite expressed desires to use an LCB as one would an economic budget, the two are not analogs. It would be much more appropriate to think of the LCB as one would a county or municipality's gross domestic product (GDP). Just as the GDP is the measure of the cumulative economic activity occurring within a territory, an LCB is based on the measure of cumulative carbon-emitting activity occurring within a territory. It does not follow that a governmental body should attempt to govern the corresponding territory's GDP as it does its internal budget. In the same way, it does not follow that a governmental body should attempt to govern the corresponding territory's LCB as if it was an internal budget. To do so would limit the scope of action for emissions reductions to the emissions arising as a result of its own activities. Several interviewees suggested that the limited emissions resource space created by an LCB would make comparisons of government actions for emissions mitigation possible. This would necessitate carbon footprint calculations for any given decision, which would likely necessitate significant investments of time to conduct such analysis. If such specific management is to be attempted by a local government, its own internal carbon budget must be calculated and apportioned to be effective as an internal budget (See Salon *et al.*, 2010). Within an LCB framework, state actors are just one of many attempting to make use of a quantified and

limited 'emissions resources.' In the following section, I build upon this understanding and present an argument for an additional approach to managing emissions and governing climate under an LCB framework.

6.2.1. LCBs as a Platform for Commons Management Approaches

My research suggests that LCBs create a local, shared emissions resource space with a calculated, finite quantity of emissions resources available to all potential carbon emitters in the corresponding territory. This creates a resource distribution challenge that invites political action to resolve. An individualizing perspective on the LCB mitigation reduction pathway, which assumes each actor's self-governance in relation to the generalized emissions reduction pathway established by an LCB, may fail to account for structural barriers to emissions reduction and decarbonization, posing a serious challenge for achieving the overarching aim of an LCB.

Remembering that the aim of carbon accounting and management, to include carbon budgets, lies beyond a simple accounting of 'tCO_2' and at maintaining a form of optimal climate makes it a natural resource management approach, with the atmosphere as the resource to be managed. The atmosphere is often described as a global commons and, to extend further into the theories of natural resource management, is one of open access, characterized by a collective-action dilemma (Ostrom, 2008). A collective-action dilemma can be described as divergence and conflict between perceived individual interests, especially short-term, and aggregate societal interests, especially long-term (Acheson, 2011). This thesis is not an appropriate place to review the literature on commons management nor conduct a comprehensive analysis to determine how LCBs relate to it. However, my research suggests an important link to such research in that LCBs can be understood as producing natural resources in a way not commonly considered, yet which I believe has significant implications for how actors might govern emissions and climate. Thus, I provide a brief, reasonable argument about this connection and suggest that it be used to inform future research.

As noted above, the atmosphere, and by extension, the climate system is often referred to as a global commons (See Ostrom, 2008 and Lacroix and Richards, 2015). By describing it in this way, it is affirmed that it is not an excludable resource. Meaning that generally speaking, no one can prevent any other from accessing or using it. Excludability is one characteristic by which resources, as goods, can be defined the other is subtractability (Ostrom, 2008). I suggest that it may be common for people to perceive the atmosphere as having low subtractability, in that any one person's use does not diminish the availability of that resource for another's use. However, this is a question largely of preception. For example, in the case of the atmosphere, part of it is a usable 'good' as breathable air. My breathing does not subtract from or eliminate resources for your breathing. The atmosphere is perceived as inexhaustible. This logic may be extended when considering fossil fuel use as well. So long as you do not burn them in closed spaces, they are considered harmless, and my burning does not prevent your burning. In some ways, the atmosphere is considered and treated as a public good, i.e., an unrestricted waste receptacle for CO_2, or 'atmosfill', where the resource is generally considered infinite or has imperceptible subtractability. I argue that this perception largely has to do with the notion of limits and boundaries. Contemporary climate science has defined some limits to the concentration of GHGs in the atmosphere due to the near-linear relationship between the accumulation of CO_2 emissions and the average global surface temperature (Pachauri and Mayer, 2015). These limits, whether conceived as temperature or concentration of emissions in the atmosphere, are based on understanding how feedbacks between earth systems will contribute to general conditions on the planet, which at increasing temperatures pose substantial risks to human wellbeing. Quantifying the remaining 'space' within the atmosphere to store carbon before more harmful and potentially irreversible levels are reached designate a perceptible limit and the infinite becomes finite. I argue that a recognition of harm is an important contributor to mobilizing political action as liberal and neo-liberal governmentalities perceive the mitigation of harm as a prime reason for the existence of the state, hence the production of an assemblage of institutions to mitigate and avoid harm. LCBs (re)produce a recognizable limit to carbon emissions beyond which actors no longer act by right but produce harm, underscoring assertions that government has an inherently

moral quality (See Dean, 2010).

Conceptualizing emissions as a global commons problem means that actors interested in governing the 'emissions resource space' must be able to exclude access to the said resource at a global scale. LCBs are, discursively, able to resolve this challenge by bringing the resource within a boundary area, a municipality or county, where some potential resource users are naturally excluded, those accessing a 'separate' emissions resource outside of the territory, and actors, especially political, are empowered to enact and enforce rules regulating access to the resource within their jurisdiction. LCBs also define a finite, measurable quantity of available tCO_2 that can be consumed by those within the territory. In this way, LCBs help to make tCO_2 a highly subtractable resource, since the use of each tCO_2 leaves proportionately less tCO_2 available to others in the territory. This allows for the re-conceptualization of the atmosphere from an 'atmosfill' to a common-pool resource (CPR). CPRs are "sufficiently large that it is difficult, but not impossible, to define recognized users and exclude other users altogether. Further, each person's use of such resources subtracts benefits that others might enjoy" (Ostrom, 2008, p. 11). LaCroix and Richards (2015) as well as Epstein *et al.*(2014) position the atmosphere as a CPR in their analysis of institutional action to mitigate pollutants, providing additional support for my suggestion to utilize CPR in connection to LCBs as a resource management approach.

Simply conceptualizing an LCB as defining an 'emissions resource space' and a quantity of associated common-pool resource units in the form of available tCO_2 is not enough to overcome the collective-action dilemma but it may make approaching the carbon mitigation challenge through CPR management principles a possibility. Ostrom (2015, p. 90) has demonstrated that the eight design principles describe how resource users, through their institutions, have successfully managed CPRs sustainably. As such they seem relevant to consider in connection to the 'emissions resource space' produced by LCBs. Additional research on the possibility of applying these two approaches, LCBs and CPR management, together in practice will be necessary.

7. Conclusions

My thesis has examined how LCBs attempt to govern climate in VG by conducting an analytics of government using interviews with persons who have already engaged with LCBs in practice. My analysis reveals the following as key findings:

LCBs seek to make climate a governable domain and contribute to sustainability transitions by making climate change present in space and time. Via the production of an emissions resource space and finite emissions resource units, LCBs make carbon emissions mitigation a question of resource distribution among actors within 'carbon territories.' They make climate change present in space, by territorializing a portion of the atmosphere, and in time by producing an eliminable number of emissions resources to be consumed within an established timeframe. By establishing a deadline for the cessation of carbon emissions in relation to a total remaining number of emissions resources, LCBs construct a mitigation pathway that demonstrates how delayed mitigation directly increases the emissions reduction challenge and establishing yearly reduction goals that increase or decrease in proportion to the achieved mitigation of the previous year. I find that these representations of the climate make climate change actionable by establishing a sense of urgency and ownership, therefore responsibility and accountability, over scarce and rapidly depleting 'emissions resources.' The produced nearness and urgency of climate change combine with a newly produced resource distribution challenge which suggests a mandate for political action to fulfill emissions reduction goals and prevent possible harms that might be incurred should such goals not be met. Such political actions require the continued problematization of government by actors, both inwardly through forms of self-government and in relation to one another through negotiation and conflict. In this way, LCBs open up critical space for the negotiation and contestation of actions relating to mitigation and distribution of 'emissions resources.' By making carbon emissions mitigation a question of distribution, LCBs make climate change a site of political action at the local level. LCBs create space for actors within the carbon territory to negotiate the distribution of scarce emissions resources, potentially allowing for additional capacity for governance beyond individualized self-government to reduce emissions.

An LCB's general emissions mitigation pathway could be supplemented with more specific reduction targets for specific areas, sectors, or industries in order to account for variation in the present and anticipated ability to decarbonize. These can be calculated in such a way as to maintain an overall emissions reduction target in line with the LCB. Policymakers should plan 'what-if' scenarios that account for failure to decarbonize in accordance with the LCB. Several municipalities and VGR intend to use the LCB in connection with economic budgeting processes yet lack sufficient tools to determine the climate impact of proposed measures. This is necessary to enable more effective comparisons that favor 'climate-smart' decisions. This issue should be investigated further to identify how this conflict might be resolved.

LCBs have clear implications for policy and politics but seem to be less clearly adaptable into strategic decision-making processes in ways that make policymakers confident that they will have the desired mitigation effect. Along with other strategies, policymakers should explore the possibility of using LCBs as platforms for CPR management approaches. LCBs produce the emissions mitigation problem as a shared 'emissions resource space' where there is a difficulty, but not impossibility, in restricting user access to the resource, excludability, and where there is a high subtractability, the resource areas consist of measurable resource units, the available tCO_2 remaining in the budget, and are finite. Such strategies may enable local actors to better manage the 'emissions resource space' across the territory since such strategies can help establish rules for the equitable use of the CPR and do not depend on a 'day-to-day' accounting and comparisons of individual actions to reduce carbon emissions. Additional research should be conducted to determine how this might be accomplished.

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10. Appendix

Within the appendix are provided the transcripts from four interviews and a post hoc summary from the fifth.

10.1. Transcript of an Interview with Trollhättan on 2021/04/08

Derek Garfield

OK, so the first question that I have, then, that I'd like to discuss with you is how has adopting a local carbon budget framework impacted the way that you think about emissions and your work in climate governance?

Trollhättan

As I work, or I think about it, it hasn't changed. I've been working with the climate issues and it's been studying like just five years ago and my knowledge about the climate changed- change is the same. I work with this issue and to keep trying to be updated and know how the climate system works and so, for me, it's no different when I was applying these to Trollhättan that was already done for the Västra Götalands Region. It's the same numbers, just another volume, but the same proportion. It's still the same. We need to lower our emissions as quickly as I knew, but didn't have numbers on it. And so for me, it's no different. And for the city, we still have lots to do because- I started working in Trollhattan one year ago and I heard this, it was- what do you call it "updrag"? The politicians have asked for a carbon budget and I realized that all people, like people I work with, and also the petition, have different views of the budget, carbon dioxide budget, was. And that probably a different idea what it would do with the city and I decided to keep it simple. For the first, we were clear that this budget is the way that Kevin Anderson describes, and it was when it was done for Västra Götaland, just science based. We calculate how much carbon dioxide we have left before we reached the Paris goal. And it's just the volume, a roof, a limit for our- and it's not like an economic budget and we can't use carbon in the same way we do economics, because we have the numbers by every day and we have the carbon dioxide numbers like 1 1/2 year latency and still just, you know, graphical values and not the- not the values for more consumption between miss and, it's just- So I was clear, we have this budget and it's just a limitation. It's just some science limitation rule and so we reformulated the whole objective for me was to make a carbon dioxide budget. And what I delivered to the politicians was a goal that was based on carbon dioxide budgets. So that's what we have today. We have a carbon dioxide goal. It says that we shall not, in the graphical area of Trollhättan, we should not release more than blah blah blah. And it is Trollhättan's proportion of the Vastra Gotaland's budget. And we also have a sentence, that we don't have number on, that we also said shall limit the consumption and due to the Paris goal,but that we don't have number on. But we have a really strong carbon dioxide goal. And in that decision just had its goals. We don't have a plan how to manage that. And when I presented this would petition, I said that we have some things going on. That's going to help us and we already have lots of things going on That's not enough, we need to do more. And that's what we have today. We have some things and we don't have enough things, but, I think we're still doing good, but I've just been working here as I said, for a quite short time, so I haven't formed a new path, I've just been keeping doing what they've done before, sort of, and we have made a mobility management plan. I've been doing that, but the decision to do that was before me so. This far I've just been going on what they already started here, I told them.

Derek Garfield

I see. So, if I've understood correctly, then the local carbon budget for Trollhättan that you've put together that was adopted by the- was it the “Kommunfullmaktig”?- the entire assembly-

Trollhättan

Yeah, yeah, yeah. The top level, yeah.

Derek Garfield

It's a- it's to set a strategic goal, but it's not necessarily meant to be a management strategy per se?

Trollhättan

No, it's just that we do some stuff, but we need to do more just.

Derek Garfield

From what you've gathered is there is some intention that this carbon budget approach should be developed into some type of management strategy or?

Trollhättan

I think it's good to have a goal that's actually in the line of Paris Agreement and not just we're gonna limit or we gonna be carbon neutral in 2040 or 35 or 30, but we have a goal that says that we need to do stuff now. That's the difference. If you have a goal that says that we're gonna lower our emissions with 80% to 2030 we can still be going on the closest years and then we have a bigger crisis, you know, so that's good. Yeah. Yeah, what would- what was I about to say? Yeah, I'm still, as a strategist and I work on this, and I'm still confused how we're going to manage to reach our goals. And we have politicians that, the ones I talk to, really wants to do more, but we still have an organization that it's- No, it's hard to do the stuff you really need to do. You need to get all the people that can bike to work to start to bike to work- And I don't know how to do that, you know? And there's so much stuff that we don't know how to solve yet. That's sometimes our, the municipality, but sometimes it's another part of the society to solve. And so, we do lots of stuff and we could do more and there's still some stuff we don't know how to solve, I would say.

Derek Garfield

Right. Yeah, so there's some things that, and you've kind of explained this in your policy document as well, there's some things that you are recognizing as within the municipality's area of authority, but then there's these other things that need to be done by civil society, kind of voluntarily of their own choice. What's the difference here? It's at least some legal definition of what the municipality is authorized to do? Or is it just something more political, that there's maybe not a political will to do certain things?

Trollhättan

It's so hard. Sometimes I think we just not aware, what we should do- that we in one time think that we want to do a lot, and then on another area we just keep on doing as we always done and it's very easy to get stuck in the small changes. You know? Think about how we transport the asphalt when we're building a road and not thinking about- do we need to rebuild this road? And- and to find- Or can we plan in the right way and, like- how can we? I'm- one thing that I'm a bit mad- not mad, but angry on myself that I wasn't more brave. We had this area that a company wants to build a lot of dwellings, small houses and also some apartments, maybe 500 households. And it's an area where it's really hard to get good communications. You can build, of course, good bicycle roads, but it's- not very far, but just a bit too far from where the bus goes and it's, you know, it's never going to be enough buildings to get an own bus and they who gonna move there are going to think it's too far to walk to the bus. And there's just a place where you shouldn't build at all. Because lots of people moving there and maybe are able to bike some part of the years, but they're not- when they move there, they're gonna have a car. And then we shouldn't build a household- build dwellings where you

need to have a car.

Derek Garfield

So, do you think that the that having the carbon budget can help you make those types of arguments to, and maybe not only, the municipal planning department?

Trollhättan

Yeah, absolutely. I think there's lots of good people in this municipality and if just reminds them on the right way, that's if you do this It's- it's not bad for climate, and they, "Ah, yeah," and we- when we have these political goals in the back and know that they- it's not only that they've taken the goal, they ask for it and they really want to do stuff. But they don't know how to do stuff and we have to always come up with ideas how to do, what you want to do. And I think the goal is even if you don't have a plan how to solve things we have a have a really good argument. And people listen to me actually, and that's nice. But I can't be everywhere and remind everybody and be knowing what's happening all around town.

Derek Garfield

Right, so do you feel like that that has become part of your position now with the carbon budget is that that's now part of your job too, is to kind of be an advocate for using this as- to remind people of this kind of emissions.

Trollhättan

That's made the rule I given myself, but it should be a better way to work with this issue.

Derek Garfield

What might that be? What kind of better way would there be?

Trollhättan

Uh, you know, I can't be everywhere, and it's not- shouldn't be on one person to solve stuff and don't have all the solutions and we all had to work together. We are doing- that's happening. We are like working with a project to maybe can solve our problems. If you look at just the carbon budget again, the rule and the meaning of it's make the subject really- It makes it important just for more than me. And that's the good thing about it, but they don't- I have been clear that carbon budget it feel like lots, especially- not- that lots of people think that "oh, a carbon budget is gonna solve our problems." And that's not the case. A carbon budget shows us how emergent the situation is. And I see that that's really mean to take a carbon budget? Just mean that- tell us that we need to do lots of stuff and put resources on it. But as all big problems we still need to put a lot of resources to solve it. We need to have people, strategic people, that have an overlook and can be experts when we need to maybe not build that much as we want. We need to- I think we need to put up more rules, like what kind of vehicles do you want in the city centre? A municipality can have that kind of rules, you know, we are not allowing trucks in the city center. The one who want to deliver stuff need to find other solutions to deliver than to use big trucks. And then make it harder or more expensive to park cars. Today it's free to park- yeah, we have this parking building- you know, we can park in a house- we have like 3 or 4 parking houses in Trollhättan which are owned by private companies. And they need to take out a fee because they need to make the business go round of course. It's not expensive, not like a big city, but you need to pay to park your car there. And then there are all these parking in the streets. And that the streets are owned by the municipality and they don't take out fees to park on the street. So, it's free to park in the street, and then you just have this, you know, time limit. And if you want to park in the house you have to pay. You know if you say that "oh, we need to have the same fee on the street and in the houses" and the politician and the leaders get really scared because "oh

all the businesses," especially now in Corona- they have this parking strategy that was ongoing and was about to be- yeah, then they started a work with taking form a parking strategy and then come Corona and then, "oh, we need to just to do everything to save our businesses in the city." And then and then it doesn't matter if you say that people buy more if they walk between the city's stores, than park the car between the stores. You know it's a "no issue" you can't get that parking strategy. It can't work because too many people think it's bad for our businesses, local businesses.

Derek Garfield

Uh huh. It seems like those kind of issues happen almost everywhere. You mentioned something about, that there are some people have this idea that adopting a carbon budget, in and of itself, it has some kind of power to enable them to solve these problems. Do you have some kind of idea about why they think that way?

Trollhättan

I don't know, maybe it's.

Derek Garfield

What is it about the carbon budget that makes them feel like that this is an approach that's going to solve this kind of emissions issue?

Trollhättan

Well, I think some people think about it as some economic budget. And all- you know and all- everything is so ruled by their day-to-day economics and budgets, and especially municipalities, have this yearly budget that- it's holy. It's still- it's the main way of ruling. If you want something to happen, you give it more money in that. And because everyone, even if you have these fine goals, if you don't manage to keep your budget it's- yeah, it's the main thing. And if you keep your budget then you can start to work with all the other goals. And it doesn't matter how much you try to work with, “oh, the environment and the social,” field should be as important at the economics. It's never that in the in the fact because first you have to keep your budget and then you can have the plan to reach the environmental and the social goal within your budgets. I think people hear about the carbon budget to think, "oh, if people have a carbon budget they need to follow it as hard as they do an economic budget." And then so I think some people maybe haven't think through it a lot and think that "oh, if we have a carbon budget we're gonna solve the problem. That's sufficient. That we need to keep our economic budget,” and that's not how it works. Then you misunderstand the idea with a carbon budget because we can't- we don't have the carbon dioxide numbers. We need- if we want to do that, you need to have the carbon dioxide emissions for every post in our economic budget. And we don't have that data and we don't- it's going to take too much resources and working time to just be close that- and then we already missed our goals. You know, it's impossible. But then I also think it's just they heard it as a so good thing. And then they haven't heard about the details about the carbon budget, but just have heard it in in a positive way and then they just think it's Oh, so, it's maybe that we're gonna do.” Yeah.

Derek Garfield

Yeah, that's something that I'm trying to explore a little bit within the research that I'm doing about carbon budgets, is understand how these- even kind of language or discursive elements of how we talk about carbon budgets makes people think about them in certain ways and have certain types of expectations and want to use carbon budgets in certain ways.

Trollhättan

Yeah. And part of how this network with all the environmental strategists in Västra Götaland. And

we- I have like I've been studying civil- no- environmental engineering and have all this scientific and mathematic background and when we heard about them- I heard a presentation on these carbon budgets that Kevin Anderson and his colleagues did for-Yeah, it was your institution, I think, who did it for Västra Götaland? And we had a presentation, I think it was by Isak Stoddard? He came up-came by link and had a presentation about it to all the municipalities in our network. And after that presentation, I thought, “oh, that can't be that hard” to put in Excel then recalculate for each town in-for each municipality. So, I did that that summer, on a day when I had nothing else to do. And then more municipalities have used that Excel because then I was working at another municipality in the region, and I took it with me. And I think more municipalities have used that Excel just to scale down the budget for the region.

Derek Garfield

Oh, which Excel is that? Is it one that you made, or is it the one from the?

Trollhättan

Yeah, it's just a- you take the budgets post from and- no, I made my own file when I where I put in the emission data from RUS, where you can get it on municipality level.

Derek Garfield

Right. Talk to me a little bit about that, because, like, the way that we use this data, I think is an important part of- It's obviously how you make the budgets.

Trollhättan

Yeah, it's very straightforward I would say. You have the budget in the publication from you and now, it's with 6,000,000 something I think, or yeah, some number, there's some million carbon. And then I just take- you have all the emissions in the region and for each municipality, and then I just take, for example Trollhättan, that's about 2% of the whole region, and then I take that percent number of the whole region's budget.

Derek Garfield

So, it's based on the Excel data that was provided then by Isak Stoddard within the actual framework for Västra Götaland's region?

Trollhättan

Yeah, it's the same data source. The data is updated every year, but the same data sources as they used.

Derek Garfield

Within RUS?

Trollhättan

Yeah.

Derek Garfield

Now I don't come from like, um, an environmental engineering background and have very much experience with the greenhouse gas accounting and the kind of processes that go along with that, and so when I was trying to find out a little bit more about RUS, I quickly became a little bit confused

about where- how are these emissions actually being measured? Who's measuring them and where? And what is that kind of reporting structure like? Do you know anything about that?

Trollhättan

Oh, it was done by SMHI, I think. The metrological institution of Sweden, I don't know what exactly English name, (the Swedish Meteorological and Hydrological Institute). I think it's- they have scientists working on climate and metrology and I think they are the main actors that provide these numbers and they do it a lot by they who do the carbon dioxide sources they do all kind of emissions. Also, the more (unintelligible) directly- (same word as before, unintelligible) emissions from and, what do you call them NOX, and uh yeah, yeah. So it's when you gather the data you have a long list of, like 20 different substances say, they calculate and- they do calculate it I think- they use or, yeah, like modeling environment, like air modeling for emissions, and they use- they know how many cars drive on a road and then they calculate how much the emission must be from that road, and then they have like the industries and then they know because the industries have to report all the their process due to their environmental law. And then they can gather that information and use that in their air models. And in that way, they have these big, complicated models they have built up for several years, for all kind of emissions, and use it for further the carbon dioxide emissions as well. And they also do both the pure carbon dioxide, which is used in the carbon budget, but also do that and like all greenhouse gases so they also measured the "lustgas"- I don't know- methane- and that kind of gases as well, so you can get them by themselves or as a complete greenhouse, carbon dioxide equivalent number.

Derek Garfield

Mmm. Now I saw in the carbon budget decision that you referenced, that one is just CO2, tons of CO2, but within the supporting documents that you also drafted up, you also included some of these other greenhouse gases and the Västra Götaland report that was produced by Anderson, Kevin Anderson, and his colleagues, didn't include any of those either. So why did you choose to include those in your report?

Trollhättan

Well, the report is just facts, the statistics behind it, and I wanted to present both the carbon dioxide and all the greenhouse gases because, even if the carbon budgets for- I've been thinking about it a lot- and should we take just the carbon or all the greenhouse gases? And I have a discussion of it in the report from your institution, and so in in the budget, in the calculations for the goal, I used only carbon dioxide, but it's still important that- all the other emissions are still affecting our climate. Like for methane, it's going to disappear. So, if you do- it's not, maybe, that hurry to do stuff, and if you do stuff now it's not- what we release now will not affect us in 100 years if we don't release it then. But the carbon dioxide we release now gonna affect us in 100 years. And for example, all now the big methane releases are from old garbage, what do you call it-

Derek Garfield

Yeah, the landfills.

Trollhättan

Landfills, yes. And we have lots of old landfills in Sweden, but we have no new landfills for the last 10-20 years. We have burned all our "rest" garbage that can't be sorted. And then, so, we have lots of landfills that release methane now, but the methane they gonna release just gonna be lower, lower and lower for every year. And so, the methane released from our landfills will not affect us in maybe 100 years. And so that is actually irrelevant to have in a carbon budget, to include those- but if we like take our cows, the problem is not that we have cows, but it is that we have too many cows and we need to have much fewer cows because they are releasing too much methane. But if they are fewer

and release lesser methane, the effect will not- will be handled about by the natural cycles. So, it's really hard to- it's here and now, and we need to have a plan for those emissions, but you can't- it's gonna be unfair to put them in a goal, that's based on a carbon budget because they work in so different way.

Derek Garfield

Yeah, I can see how that makes sense. It's tricky stuff to figure out what it is that you should do and how, and I guess that's why there's politicians who were supposed to do that kind of stuff as well, but it seems like you work quite independently, you know, when you were putting together this- the carbon budget itself, you know, it seems like you were able to have- you have quite a bit of discretion in how you constructed it and writing the report and things. Is that true? So, so how does that-

Trollhättan

It was more like so many people have so many opinions and don't have the knowledge, so I just did it by myself. And just took that freedom and no one was sad about it.

Derek Garfield

When it comes to, though, developing and the future- and getting back to kind of what we were talking about, maybe, before with your not able to be everywhere at once, you know, to kind of be a consultant. What kind of role do you have then, when it comes to giving, maybe, policy recommendations for how you could translate this kind of carbon budget approach into some measurable goals for reduction? Is that something that's also kind of become your responsibility, or is that something that's understood to be occurring within each of these administrative departments within the municipality as well?

Trollhättan

We have this worked- I think it's worked quite similar in in all municipalities, but you have this main document in Trollhattan is called “mål och resurs plan,” Goals and Resource Plan, and a part of that is the budget. And that is that like the head document that the fullmaktiga are taking each year. And the and the goal part- the budget part they take every- but the goal part they take every 4th year and a new mandate period. That's probably different in in different municipalities, how often we take this document. But then, like all the different parts, the school Department and the Civil Planning Department, so they have their own budget and are responsible for their part, of course, they are the head responsible for their part of all the goals and the economics. But then you have, for the budget, you have the economic Department that help all the city with that part and in the same way we are, actually, in total 6, sustainability strategists that help all the municipality with the goal- that the parts that's not budget connected but connected to social and environmental issues. And so that's one of my main roles, together with my colleagues, where we are two people working with environmental and then are actually four people working with different social aspects. And one of our main- what do you call it, main objectives in our work is to help the municipality manage this goal and do the yearly follow up for the “års redovisning,” this document that you do every year with how it went with economics and how it went with goals. So, we are writing the sustainability parts of that and collect what all the different departments in the city have done. You know? So that's one of our main goals, the main objectives in in our role. Yeah, and then you realize that we have some goals that's hard to reach and one of the goals is with the climate aspect. And parallel with that we have an ecological strategy and social strategy that in more detail defines what we need to do in those areas. And then work with that can be really different depending on which person that's sitting on the on the strategy post and what kind of organization you are and how you can work and- Yeah.

Derek Garfield

Do you see that there's room within these processes for the carbon budget to take a more strategic

role, or is it is it not something that's seen as is serving that purpose?

Trollhättan

I think we are out searching for a more strategic and formal role to work with a carbon issue. And it's mainly me, or my office where we're sitting, we, with my social sustainability colleagues, me and my group of people, and- what do you call it? Is it civil planning, society planning? Yeah, and that department we are working quite closely in different ways to find a way to work with these issues better. They have a goal that in their department to make a climate analysis on- we have call this "detalj plan" you heard about it?

Derek Garfield

If I understand correctly, it's kind of the zoning plan for the city?

Trollhättan

Yeah, and it's about- the municipality have this monopoly how to use the the land and then need to do this "detalj plan" a detailed plan to zoning and how to use the ground. And we have a goal, or they have a goal, to make climate analysis on all the detailed plans and all the projects they have in Street and Recreation Department. All their projects like building a road or rebuilding a road or making a- do something with parks, you know. That's one thing going on and just this month they come up this- you know about Viable Cities? It's a-

Derek Garfield

Yes.

Trollhättan

Yep, Yep, and the climate neutral cities in 2030. It's a big- so we try to apply for that, and that's one way to formalize the work is to get the help from that. To now, this is my first year in Trollhattan, it's been quite unformalized, and I've just been working with the stuff that comes up. And have that idea that if you just taking the chances you get, you make- it's not- it can fail of course, but if you if you manage, we're gonna get more done than if you put lots of effort to try to make a good plan and then it takes 2 years to make the good plan before we start to do stuff. I've been working like- try to do the stuff that comes up instead. And that's not perfect, but it's been working this year. And we need to formalize it in some way and maybe this application is a way to formalize it and by having all the parts we need to do if we be a part of these 20 cities. That's a way to work with the climate issue and otherwise we probably need to find another way to work with climate. But we're still searching, I would say.

Derek Garfield

We're quickly running out of time and there's like a lot of things I'd like to talk to you about, unfortunately, but one of the things that I've kind of caught onto in my analysis, that I'm kind of proposing, is that maybe carbon budgets allow us to think of emissions in a different way than we usually think about them. And so what I'm kind of theorizing is that that because you have, once you have a carbon budget that you can measure, and you have a unit of a resource that could be seen as being subtractable from this pool of resources, then maybe that allows you to approach carbon emissions as a- with the natural resource management method like common pool resources and so you could use,

Trollhättan

Common pool resources. What do you mean with that?

Derek Garfield

I don't know if you're if you're familiar at all with them? The work of- oh darn, and I now I forgot her name all of a sudden (Elinor Ostrom). Yeah, so it's within this, again within natural resource management theories, common pool resources are understood as resources that you could not exclude people from accessing but they are considered highly subtractable, which means that as soon as you remove one, there is proportionately one less of that resource that's available. So kind of these global issues like fisheries, you can have for every ton of fish that you subtract there is that ton less, but you don't have the ability to prevent a lot of actors from going in and accessing that resource. And so I'm thinking that, in some way, carbon budgets could open up for this possibility, to think about the climate in that way. And so, then maybe you should start to adopt different types of management principles based on that understanding of the climate, rather than what we kind of do now, which is just think about CO2 as “it's just waste” and so the only thing we're really talking about is, the same way that a landfill fills up, is we're just filling up the atmosphere with this kind of waste. And so you don't value the carbon dioxide in the in the same way that you might be able to if you think about it a little bit differently. But this is just kind of a preliminary thing, but maybe you have some kind of thought about that? What would it mean to think about carbon dioxide, not just as a waste, but as an actual resource where you can measure that people are actually subtracting that resource? Utilizing it?

Trollhättan

The problem is that it's so hard to subtract it then, utilize it, just purely physical. And it's so hard to extract carbon dioxide and that's just- it can't be a solution. That's something we maybe have to do in in 50 years, but nothing we should plan to have as a solution now.

Derek Garfield

I think what I'm thinking is, is not so much about the carbon sequestration.

Trollhättan

You're not thinking about the physical, no?

Derek Garfield

No, it's about totally reimagining how we actually think about the emissions themselves. And so every time we're burning some fuel source that's producing carbon emissions, we can think about them as utilizing this space within the carbon budget, and maybe that's a weird way to think about it, but I'm-

Trollhättan

Yeah, I think maybe- some people that are glorifying carbon dioxide budgets are thinking in that way and that's a fantastic thought, but I don't know how to make it work in reality and adminitrate. Of course, you can think about it as an individual and have it as an imagination and how you do your decision, but if you want to have it in a bigger scale and work with companies that have to have numbers and stuff. It's too hard to administrate that that kind of thing. And I also think that you have the trading with carbon in the EU and that's a good thing, but that kind of organization and administration it's hard to for a municipality, especially a smaller one, to come up with a local way of dealing with carbon dioxide. It's something that maybe, maybe a big city, but a state needs to do. And in a municipality, we'd need to do the more hands-on stuff, not a big rules system, where we can use the rules that the state has come up with, but we can't come up with our own rules, you know. Yeah, and in some questions, we're really bound to what the- we have this big issue, it's- I'm not- I’m just watching it and there are some good seminars, I think they're all in Swedish, I'm sorry, but this- how “trafikverket” our traffic agency in Sweden is working and how regions and Municipalities try

to work with traffic and road issues and how the “trafikverket” they have this goal of- now I feel like, now I'm just a personal opinion from this debate and maybe not objective, but I was listening to a debate between region- with the regions that, from managing the regional infrastructural planning, which are highly dependent on the national traffic planning, and the national survey planning are by the “trafikverket,” and it feels like "trafikverket” is just something that “we want to do as we always have done” and the environmental problems are for someone else and we just do what- you know, they feel like a slow downer in this process in many ways. And they had that kind of issues that we have to deal with in our municipality and think about the carbon dioxide as a way of thinking as a resource or try to deal with carbon dioxide- that's a good thought, but I don't know how to manage that in in the real world and to have it have it working in a good way, you have it- if you need- It was one idea I heard, if you can do it like a really simple way that you have like a list of goals and if you should have some kind of competition between your employees. That you can mark off every time you don't take the car to work and by that you can like say that “oh, I saved this much carbon dioxide this week” and then you have like very simplified stuff you can do as an individual or as an employee. And then you have like simplified how much carbon dioxide you save for every everything you book and you can have a competition of that. But then it's totally another scale- that's of course it's possible to come up with that kind of system, and that's something we can work with the municipality. I think I just I don't know. I hope you get something out of this conversation.

Derek Garfield

No, yeah yeah, I think I think so because it's something that I that I want to try to consider a little bit more, so it's nice to get some of your thoughts about it, but it maybe it's just not the right scale to try to approach it from a municipality level to do some type of Common pool resource management approaches. I'll definitely think about that too when I'm looking at my analysis and the suggestions that I'm making within my discussion because I want to try to make my discussion portion and analysis relevant for actors who are pursuing these carbon budgets so that they can get a better understanding about what things are- well, what kind of problem the carbon budgets create within emissions. You know, how they make them into certain types of problems that can be addressed by certain types of strategies? Yeah, so can I ask you about one more thing?

Trollhättan

Yep, Yep.

Derek Garfield

In your supporting materials for the carbon budget, I noticed that within the graphs it looks like at least, and it's maybe not an exact figure, but the transport emissions have remained, it seems almost exactly the same since the 1990s, there's been a very little decrease. But how's the population change been during that time with the with the actual residents within Trollhattan?

Trollhättan

It's been increasing, not a big one, but that's been- I think it's quite close to the average in Sweden. And the last five years I think it's been one person per year, about that, the rise in population every year. Earlier we had this car factory in Trollhattan, Saab. I don’t know if you heard, but when I grew up there were two Swedish companies and not just one Swedish company. And they, I think it’s now 15 years or something, they broke and never come back. Before that Trollhattan, was like a car city and people were driving Saab because they were manufacturing Saab cars in the town. And after that there was a big dip and high non employees and then today Trollhattan is more of a small- there's been lots of high-tech companies and like a small scale LINDHOLM and- or you are not from Gothenburg, I'm sorry, but more high technology companies in a small-scale Science Park and connected to the high school, and it's recovered quite well I think from you know the big company that's blown away. So today we have not- have no big industry that have lots of emissions. There are some factories still, but they're not that kind of factories that have- Yeah and I think what I was come

to, you can look how many cars you have per person in the town. And after Saab went away, the number of car per person have been going down, so before we we're a bit above the average in Sweden and now we are at the same level as the rest of Sweden when you look at car per person. But as everything the cars get better, but we drive a bit more and then they take out each other.

Derek Garfield

Yeah, Jevon's paradox.

Trollhättan

Yeah, they are better, and we are more people. So, the more efficient cars taking out and then you see that we have the same emissions today as before. And it's still, even if it's small town and you probably can bike and take bus from all places to the center, I think it's still this culture that you use your car if you have one. If you move to a house from an apartment, you get a car, even if you don't need it. And then people are drive- it's a car culture. Even if you don't have to. If you compare to other cities in the same size I think.

10.2. Post hoc Summary of an Interview with Falköping on 2021/04/09.

The interviewee mentioned that the emissions mitigation pathway constructed from the LCB was useful for stimulating action since it allowed politicians to visualize the urgency of taking action now to prevent cumulative emissions. Mentioned that the Green Party had submitted a motion to adopt a LCB several years prior, but it was voted down. Perceives a wide acceptance and growing interest by all parties to work with environmental issues, and emissions specifically.

FK is currently redeveloping its climate strategy. Has been neglected in the past. Klimat 2030, and the Municipal Pledges, served as a basis for this renewed strategy in several ways. Not decided if FK will create its own LCB or if it will use LCB-VGR, both are acceptable within the Klimat 2030 Municipal Pledge framework. Stated that the LCB will serve as a goal and, in some undefined way, a strategic management approach, though the interviewee was unsure what that might look like. Stated that the LCB will for part of the yearly reporting that the Municipality performs. Stated that climate has been given greater attention and that the environmental strategist gets 10 minutes to discuss climate issues during the quarterly economic budgeting meetings. Climate impacts are to be considered by administrative departments and form part of their yearly reports.

Actors often desire to connect LCB with economic management. Stated that it is not possible to do so but could not answer why.

Stated that not many understand the scientific basis of LCBs and climate change. When probed about what kind of knowledges might be necessary to understand them, responded that the interviewee's had prior experience and exposure to climate science working with climate sinks. Said that is was not necessary for all actors to have a good understanding of the science behind carbon budgets. Municipality is more interested in systemic changes to make choosing less climate impactful decisions easier, rather than direct regulation. When ask how actors outside of the municipality should use LCB, responded that it is not necessary. Mentioned that the group Fridays for Future have been pushing for individualized LCBs and apps for citizens to track their carbon footprint/budget.

Confirmed that the territorialization of carbon emissions was necessary for state actors to govern emissions since that is how municipalities operate, over geographical areas. Stated that it is problematic since climate change effects are global. Lack of consumption emission and other GHG considered problematic for Municipality.

When asked about Klimat 2030 and the relations between regional and municipal action on LCBs, responded that there has been increasing collaboration between environmental strategists across the region through monthly meetings and a Microsoft Teams page where they can ask questions to each other. This collaboration is important since many municipalities have only one environmental strategist, so relying on the work of others is critical to effective action.

Seemed interested in the idea of re-conceptualizing LCBs as a platform for CPR approaches for NRM, but was unable to contribute ideas about what that might mean or how that might be actionable. Was supportive of thinking about natural resources more holistically and less transactionally. Stated that they felt they had the opportunity to discuss philosophically such conceptualizations, but that they were unable to operationalize them due to systemic constraints relating to municipal administration.

10.3. Transcript of an Interview with Lise Nordin, VGR on 2021/04/12

Derek Garfield

All right, Lise. So, what I'd like to start off asking is about these local carbon budgets, the topic of our kind of interview discussion today, then. What is it about a local carbon budget that helps us to envision or think about emissions in a different way than what's been done in the past?

Lise Nordin

We realized, after working with this topic for a while, there is quite a big difference between our earlier climate goals and carbon budget, and the big difference that we have discussed is that the carbon budget shows us both that the relevance to the Paris Agreement to see that our work is in line or not in line with the Paris Agreement, but also that it helps to show how we need to reduce emissions now, here and now, and not later. 'Cause there is always a tendency that politicians, policy makers, are hoping for technology development or other things happening in the future and that will help us to reach our goals. But the carbon budget has really showed that we do not have time to wait to do activities to reduce emissions. We need to start here and now. And the carbon budget gives us that, the stress that if we do not reduce emissions this year, we will for next year have a new number, new figures that that shows that we need to reduce more. So, I would say the biggest difference for us to use carbon budget is that the time perspective. We cannot wait.

Derek Garfield

OK, that's interesting. So, if you could identify one difference, it would be that the way that the carbon budget constructs this kind of timeline for emissions reductions, so this kind of mitigation pathway, that's-

Lise Nordin

Yeah, yeah 'cause I mean, I worked with environmental issues for a long time, but I had not realized the big impact of the accumulated emissions. We did a couple of scenarios from now to 2030, showing that if we wait to reduce emissions until like 2028, 2029, we will have limited amount, the double amount of CO2 in the atmosphere compared to if we start now reducing the emissions year by year. So the pathway to a target by 2030 or 2040 makes such a big difference. Even if we would be standing in the position, reducing the CO2 emission by the same percentage by 2030, the way we get there makes a big difference. And these visuals that we're trying to work- I mean it has really taken some time to realize that and I think still many people in my organization has not realized how it makes a difference on the on the climate and the greenhouse gas effect. Whether we wait or not. So yeah, the timeline is mind blowing. And it is a big challenge because so far, both in my organization and what I see in most municipalities and also the national Parliament, it is much focused on the targets, how

many percentage we shall reduce by 2030 or 2045. But this timeline, they need to start now. It is a new perspective.

Derek Garfield

The kind of changing percentages that you're talking about here. What is it that makes that different? Because the carbon budget does include a percentage mitigation pathway. So how is it a different with in that regard than previous reduction percentage target goals?

Lise Nordin

That it shows that how much we need to reduce this year and next year. We have decided that the carbon budget is not to be seen as a new target or goal but as a tool to reach our earlier decided goals and the goal is to reduce by 80% by 2030. So that is the the main target. I mean, we could reach the target by 2030 by doing lots of activities by 2029, the last year before the ending of that target. And to do that way we would emit much more CO2 rather than starting now. So, I mean, it is a percentage still but it is a percentage per year. It is broken down into a yearly- so you could say that the carbon budget gives us a yearly goal. We cannot wait and we need to do it every year. So it is all about the accumulated effect if we wait.

Derek Garfield

What type of processes does incorporating a carbon budget bring to maybe your work or working within the municipality?

Lise Nordin

I would say before the carbon budget it was seen as different alternatives or different political aspects whether we should do activities now or later. It was a choice by a politician, or the governing politicians, to say we choose to focus on, for example, technology development that will happen by 2025 and therefore we don't need to do anything now. It was seen as an alternative, an option, a political view, whether we should do activities now or later but with the carbon budget it now decided that we should try and follow this this line to reduce by 16% every year. So, it gives a much clearer guidance in the climate work that that we're working with in my organization. We are now responsible to answer the question every year, what have we done to reduce the emissions this year and what result have we gotten? So, it is no longer a possibility to say that “we'll see how it goes,” “we'll see what new technology or new solutions we have in a couple of years,” but our politicians are now responsible to answer the question what is happening now, what decisions had led to a reduction in line with the Paris Agreement here and now.

Derek Garfield

Who's in charge of that kind of monitoring and follow up work?

Lise Nordin

That was the biggest discussion for us to “ta fram” to get the carbon budget. What would you call that word? The process, the-

Derek Garfield

Yeah, to "ta fram den”? I lose my train of thought too when I start to try to think between two languages as well-

Lise Nordin

Yeah, then, let's say the process. The process for us to get the carbon budget and the biggest challenge for us was to find out what role is the carbon budget? Who is responsible for monitoring it and who is responsible for all activities needed to reach it? So that was a struggle that I would like to tell you more about later. So then who is now responsible? It is a split responsibility. It is written in our carbon budget decision that Västra Götalands Regionen, that I work for, has initiated the work with having a carbon budget for the whole territory, but is not responsible only, or is not the only responsible part, for making sure we reached the target. But the carbon budget is addressing the municipalities and the companies and all organizations and the Academy that we all need to do this together, but Västra Götalands Regionen can only take responsibility for what we do. We can ask other actors to help out, but it is a challenge that we now have a carbon budget that is for the whole territory. But not all actors in the territory say that you want to work like this, but only one actor, Västra Götalands Regionen, which is a big actor, but we don't have all the tools necessary. But in our organization, it is the “miljönämd,” the Environmental Committee, responsible for following up the work and make sure that the carbon budget is being used the way it was decided. So, that is the political responsibility, we are now deciding on a group of researchers that will have the task of evaluating and giving recommendations for all actors in Västra Götaland, and in that we are inspired by the national "klimatpolitiska rådet”, that has eight researchers, with the task of evaluating the government's climate politics. So, we are now creating a similar group that will do that task in Västra Götaland and their job will be to use the carbon budget to see are we on line, and if not, what activities needs to be done? So, we're not done with that yet. By the summer we will have a suggestion on what the group would look like, what, which researchers and what will their trust be, and I'm not working with writing down the "updragsbeskrivning”- the paper telling them what to do. Should we try and figure out that word so we get that right?

Derek Garfield

"Updraget” that's “the responsibilities?”

Lise Nordin

Yeah, the assignment, maybe is the right word. So, our politicians will decide on the paper describing the assignment of this group of researchers. So, they will have an important role as, trying to answer your question who will be responsible for monitoring, they will have an important role in monitoring and evaluating and then we will see who will listen to what they write. But that is the same as the national "klimatpolitiska rådet” that they write this yearly report that is getting a lot of attention. It is written about in newspapers and it is used as a background in political discussions on what priorities to make and so on. And I hope that we will have the same situation that the report from the researchers will come one once a year, and it will be presented to different political groups that we have and then hopefully it will help the politicians and the companies and organizations to make better decisions, but it is not forcing them, of course, but it is probably a very clear signal. I would say that even though the researchers cannot decide what the politicians shall do, it will be hard for the politicians to say “we don't care” if we have this research report yearly that will monitor and evaluate the climate activities in the region.

Derek Garfield

So, there is going to be kind of an independent panel that does monitoring and review as well besides the work of the Environmental Committee internally as well.

Lise Nordin

Yep.

Derek Garfield

This differentiated responsibilities that are kind of discussed in the Paris Agreement sees an

interesting reproduction, I think, at this kind of more local level when we talk about that there's different actors responsible for different things as well. And I know that maybe this is a little bit more of a of a hypothetical, but what does adopting a carbon budget, within any level of government, what does that really mean for civil society actors or companies?

Lise Nordin

For people living in Västra Götaland it can be used as a tool to as your politicians “what do you do to reduce emissions in line of the Paris Agreement” to give it gives them a tool. It's quite- very clear, what needs to be done and it is easy to monitor. We are now discussing also using the tool “climate visualizer” that is a digital tool that everyone can use it and see, “how are we doing?” “Are we reducing emissions?” So it will give a lot of knowledge and tools for everyone to see how is the work doing and what needs to be done. So, for example, for the voters it will be easier for them to ask their politicians, “what have you done?” to try and get the answers, “Are you taking responsibility for the carbon budget?” And for the companies, I think also the same that they will have more knowledge of where we are and where we need to be. We have a couple of companies who have started discussing using a similar tool for their emissions. But I believe that just getting a carbon budget and having it in place is an eye opener. And we have, so far, informed our Climate Council, "Klimatråd Västra Götaland,” that I emailed you about where we have a couple of the biggest companies. So, they are now aware of how slowly the emissions are reduced right now and how much faster this transition needs to be done. And I honestly think that not everyone is updated on that, but most people would be in shock, how much we need to do and how little is done so far to reach our targets. So hopefully that is affecting the companies just learning about the situation. And I think also for them it is important to start to see how much emissions are you emitting right now and how quickly we need to have this change. Because also when it comes to business, it is easy to hope for the big technology steps in the future. And we need the changes of technology and we need the technical fix also but it is not enough. We need to reduce emissions here and now. So, we are hoping that the business will be inspired by working with the carbon budget or having the knowledge to see where we are and what needs to be done. But we'll see if it is enough because the business is a big challenge for us in Västra Götaland and almost half of our emissions are from the industry that are part of the EU ETS, the trading- what do you? What is that in English?

Derek Garfield

Is it for the carbon offsetting?

Lise Nordin

What is that English word? Yeah, the European Union system of carbon taxation, yeah.

Derek Garfield

OK.

Lise Nordin

So, most of our emissions are part of the EU ETS European trade system and their emissions have even increased during the last five years. So, for us it is necessary to get the industry to reduce their emissions, otherwise we don't have a chance to reach our carbon budgets. So, the businesses are even more important to get along in our part of the country than other part of the country is because they are such big emitters in Västra Götaland.

Derek Garfield

I'd like to ask you about this particular subject with these companies and them trying to account for their greenhouse gas emissions and what, in my analysis I'm seeing, could be a potential conflict in

understanding carbon emissions within this kind of carbon budget framework for companies. Because, as I'm sure you're aware, the emissions are based on territories, but companies don't really operate within these kinds of bounded territories. So, what's the responsibility there, would you imagine, for companies to do in their accounting? What should they do to try to account for their emissions here in Västra Götaland?

Lise Nordin

Well, I mean they calculate their emissions in in a different way, they don't take into consideration the regional level of Västra Götaland. So, for them it is more natural to see how big emissions do they have today and set a percentage on how much to reduce that. So, they, I don't think, I can't see them having a part with a specific number, how much to do in Västra Götaland's carbon budget, but rather having a carbon budget for their own emissions. I mean if they are today emitting 100%, they need a target, maybe to reduce by 15% every year out of their emissions. Right? But it will not be possible to give them a specific number out of the regional carbon budget. But I want them to be aware, of course, that their emissions in our territory will affect whether we reach a carbon budget or not. But some of these very big emitters they are global companies, so it is not possible for them to say what they will do in Västra Götaland because their business will be similar in in many parts of the of the world. But maybe we can, if they have their headquarters in Västra Götaland, perhaps we can influence their boards, to do activities to reduce emissions, and that will also help them to reduce in other parts of the world where they have production.

Derek Garfield

Is there some? Uh, and maybe I need to ask this more directly too, so right now we've talked about carbon budgets as a means for setting goals within Västra Götaland, but is it also seen as a management strategy as well? That this local carbon budget should be a way to manage and conduct climate governance in general in Västra Götaland.

Lise Nordin

Well, I think I need more guidance there and you said it management tool? Say again, I'll try to gather my thoughts.

Derek Garfield

Right, so it besides just setting a reduction target like we've already discussed, is the framework of a carbon budget taking form within the kind of strategic planning and management within different areas of responsibility across the municipality. And if so what does that really look like? How does, maybe the transportation department, how do they use the carbon budget in order to make decisions?

Lise Nordin

Yeah, thank you. I'm not as quick in English. My thoughts are not as quick in English so I needed it hear that again. I think your question is spot on because we need all other areas, all departments, to have this in mind. It's not enough if the environmental departments are thinking about this. So, that has been a struggle. The ways that we are now hoping for this work is we have two big tools that decides the policy, the main policy, and one is the economical budget, set yearly, and to address this question that you are asking, we have written in the decision of the carbon budget that the economical budget shall address what activities needs to be prioritized in order to reach the carbon budget. So, we have one important sentence in the decision that the economical budget needs to address this. Whether that will make a big difference or not, we don't know yet. I see a challenge. It is it is not guaranteed that economical budget will be different in that aspect. Because we are waiting for the first economical budget now, in June, after the decision of the carbon budget. So, it's kind of too early to say, but we are hoping that it will make a difference. So, we have written that sentence, that economical budget shall address the carbon budget, but we'll see whether that happens. The other

policy tool, the big policy that is important for us, is what is called the regional development strategy. And that is the policy that is decided with both the regions and all the 49 municipalities. So, it is the common ground for the upcoming years. And we have now just decided on a new regional development strategy for the next upcoming 10 years, so between 2020 and 2030 is the new strategy, and all municipalities are standing behind this. It is in the decision with the carbon budget written that this strategy shall, I will see if I can remember the words, shall use the carbon budget as a tool in its implementation. So, we are trying to get those two together. That the carbon budget is a tool for the regional development strategy, but also there I have the I have the same worry. We don't know for sure whether that will happen, but it is decided that shall be working together and being evaluated together. So, that is two tools, the economical budget for VGR "Västra Götalands Regionen" and the whole territory with all municipalities. But I believe that the challenge is bigger than just deciding on these sentences that they shall work together because we know that the carbon budget will set limitations on a lot of other activities. So, I mean, thinking that thought through all the way will set quite a strict framework for all other activities, and I'm not sure if everyone is aware of the consequences, well, no one is aware of the consequences because. It is an analysis and discussion that needs to be done every year.

Derek Garfield

So that's interesting and quite nice to hear, if you're someone like me and wants to hear that there is some kind of progress being made on climate governance, and that's coming more to the top of the priority list.

Lise Nordin

May I Just say, before we continue there, that when now I describe this for you, it sounds like we don't know the results. And we don't, and that is the scary part. We don't know how the carbon budget will make a difference at all, but I would say that we have done a very ambitious work trying to make sure it will. And even though we have worked with this for more than a year, trying to get the carbon budget into the management, and I mean, who will monitor, who will decide, how will this be followed up, and how do we get this into all different departments and municipalities and businesses? So even though we've worked so much with this, we don't know where this will lead. So, it feels like we are a bit of experimenting. Because when I started with this more than a year ago, I tried to find inspiration in other regions or municipalities that had implemented a carbon budget in any way, because ordering the report from Uppsala Universitet is one thing. But then working with it is such a different thing and I would say that we have gotten and, we "har kommit langst," we are the front runner in some parts. I haven't found any other region or municipality that has done more of the implementing work and management work. But still, now, when you ask me the questions, I hear myself saying that we don't know the results. We don't know if it will make a difference.

Derek Garfield

Yeah, that's something that I've been reading about a lot as well. And you know, just in general, within my program and I don't want to derail our conversation a little bit, but that working with that kind of radical uncertainty and not really being able to measure what the consequences might be, because we haven't developed the tools to make those measurements. Yeah, but that that brings me back to what I wanted to follow up with is that it's, in some regard, already been connected, the carbon budget to your economic budget. Why?

Lise Nordin

Because we need them to work together. Our budget is so much money, so whether that money is being put into activities increasing or reducing emissions will make all the difference whether we reach the carbon budget. So, if the economical budget doesn't take the CO2 emissions into consideration, we can never reach the goal. We believe that a couple of decisions that are being made within the economical budget are making it harder for us to reach the carbon budget. So, one thing

is that “vi måste sluta göra fel,” we need to stop making the wrong decisions. It is one thing to get up to speed with the decisions that will reduce emissions, but the first step should be to stop doing activities that that continues to increase the emissions. And that is, for example, we have in our budget, still, economical support for one of the regional airports. And that is taken as one example of what is not helping us to reach our climate goals. So that is why. But as I said, we don't have a very detailed plan on how those two should work together, but it is, well, it is only one sentence within the carbon budget decision, saying that the economical budget shall address and this. But lately, today, you know this morning, I got an email from one of those in the political staff working with the economical budget asking me “what does this mean.” And we don't know that yet, how they will interpret that. I mean another way, I know that the UK, many years ago when they enforced their climate change act, they had a very ambitious framework where every department was gotten their own CO2 budget and if they wanted to make any decision, they had to calculate the CO2, the climate effect of every decision and if they wanted to make a decision that would increase their emissions, they had to negotiate with another Department in order to get that emission allowance. And, I mean, that is a very strict way of doing it, that every Department, every decision, has to be analyzed in in the framework of carbon budget. So that is impressive. But we didn't get anything that ambitious. So, I would say, this sentence addressing the economical budget is trying to put the perspective that the economical budget needs to be in line with the climate work, but we don't have a framework of how to do that, and I think that will be very complicated. That is far away.

Derek Garfield

It's one of the things that's come up already in the other interviews that I've done, and something in my own analysis, going through the carbon budgets and trying to understand how it frames emissions as a certain type of problem. And you know, even in just the language aspect of it, of a budget, you know it can make this direct kind of connection to economics. And so, I was curious to know about what that connection might be for doing this in Västra Götaland and if that seems to be The Way that people think about carbon budgets is that somehow, it's supposed to work like an economic budget.

Lise Nordin

Yes, I know, I know that “ordfarande,” is that chair in English? The chair of the Environmental Committee, when suggesting the carbon budget in Västra Götaland, that was one of the things that they said. That he wants the economical framework to be inspiration for how we should work with the carbon budget. That it should be the same way of thinking that we have limitations. We have this much emissions or this much money, and then we have the choice of how to use it. So that was a thought in the beginning. But we are not there yet, having any detailed descriptions like that, but I hope perhaps in in the rethorics that it is experienced as a budget being something very- what's the word I'm looking for? It's very concrete. It's not just having a policy, it's a budget. You need to follow a budget. So, I think that the choice of word carbon budget is wise. Also, I find that the thought is the same because you. The same thing is that you have a limit. You have a roof, limitation, on how much you have. You cannot, with wishful thinking, decide that you have more emissions or more money. But you have a limitation and that you need to follow that. So, with the carbon budget, we are connecting our climate work with research and science. And that is a big change. 'Cause, I mean, the target we had from before, reducing by 80% to 2030, that was not set out of research, to be honest. It was a political decided target. But now, with the carbon budget, we are connecting our work with science and that gives it the strength. So, it has been very important for us that Uppsala University has done this work. We would never do it by ourselves. It gives a big credibility. Our politicians feel safe that this is part of science and collaboration between universities. So, we are leaning on that.

Derek Garfield

Then bringing in the University aspects of it makes me think about one of these other aspects of carbon budgets that I'm trying to understand, is what type of knowledge do they actually depend on. And who has some type of control over that knowledge, so who can be said to be knowledgeable

about these things? What's your experience with that? Who is it that is seen as the authoritative voice for carbon budgets?

Lise Nordin

Our politicians, they have only met the report itself from Uppsala Universitet. So, they have never had any contact with any of the researchers in Uppsala. That has only been me, I realize. So, they're all believing in me. I've had a contact with mainly Martin Wetterstetd, that was our person of contact when we decided to have a carbon budget and ask them for this report. And it hasn't been questioned at all among our politicians, what is the word for “tjänsteman?” I am a “tjänsteman.”

Derek Garfield

Yeah, you're a bureaucrat, I guess. Yeah, it's kind of an impolite word to use towards you maybe. You're an official.

Lise Nordin

An official, alright. So, I haven't heard it being questioned at all. The- what's the word? The status or the science behind the carbon budget, it has not at all been questioned by any politician or by any bureaucrats or anyone at all in Västra Götaland. So, that- when I hear you asking the question, I'm like someone could have done that, but that didn't happen. So, everyone has I think, found it very positive that Uppsala Universitet has this research and that we have ordered the report and many other municipalities and regions are using the same models. So, it gives the feeling of “trovärdighet”-

Derek Garfield

Believability and credibility?

Lise Nordin

Believability, yeah yeah. Credibility. And I could say that the first time that I presented their report and the findings from Uppsala Universitet for the Environmental Committee, there were a couple of questions. Why did they not integrate others greenhouse gases? Why did they not calculate the 1.5-degree target rather than the two-degree targets? Why shall we take into consideration the emissions of these big industries? They're not seen as a regional asset, but rather a national asset. So that was three questions that was being discussed. And then after the discussion, the politicians decided it is better that we don't make any changes in the assumptions and the work from Uppsala Universitet because then we cannot lean on their credibility and also it will not be comparable to other municipalities. So, it was a very important decision in the beginning of the process that we shall use the same materials as Uppsala Universitet. But then, we have had a couple of critical voices with some of the decisions- I'm looking for that "vägval”-

Derek Garfield

Yeah, I'm not sure.

Lise Nordin

Let’s just say decisions with some. Some of these decisions, some actors have been a bit critical. We have, for example, the LRF, the Organization for Farmers, they have been quite critical and some of their members has even written up articles for the newspapers saying that the carbon budget that has now been decided it's not taking into consideration the possibilities of farming “kolsänkar” is another word-

Derek Garfield

Sinks. Carbon dioxide sinks.

Lise Nordin

Thank you, the sinks, they're not into consideration the sinks. So, that has been one aspect where some actors here has been very critical. Saying that this work is not trustworthy because they're not taking the sinks into consideration. And we have tried to answer, and Martin Wetterstetd has tried to write more papers that we have spread, like what is the scientific backgrounds on that and so on. So, there has been a little bit of critique pointing at Uppsala Universitet and their decisions with sinks and also with CCS technology. That's where the industry is depending a lot on the CCS to reduce their emissions and the model from Uppsala Universitet is not taking into consideration the possibility of CCS in the future. So, that has been scientific discussions somewhat that has been a bit complicated. So, in those specific, the sinks and CCS, there has been critique that has kind of raised the question who waste their authority here? Or shall we just rely on Uppsala Universitet? And the politicians are still standing steady saying that, yes, we shall. But this has been a discussion.

Derek Garfield

Interesting. This question itself really struck me because when I was reading through this report, and I don't have a background in environmental science and engineering, I come from the political sciences, one of the things that they were, the report said, is that they were relying on CO2 specifically because it was easy to measure. I thought to myself, “well, I don't know even how CO2 is measured or by what means or by whom.” And so, those types of questions are what I'm kind of looking at too, you know, is what types of systems are we empowering by relying on this type of framework that depends on very specific types of processes and knowledges? And so, it's interesting to hear your perspective too on what other things people are picking up from analyzing these documents.

Lise Nordin

Yeah, and that one that you mentioned now, I'll add that to my list as well. The why only carbon dioxide and not methane, for example. Because we have a lot of emissions from the farming and why do we not take that into consideration here? So that has been a discussion as well. But again, we are relying on Uppsala Universitet, so it's obvious to me that we very strongly been relying on a framework from Uppsala Universitet, so in that there is a lot of power. So, that decision to not calculate other greenhouse gases is making a big difference. Then, on the other hand, we will not stop doing activities to reduce emissions from methane, for example, but we are saying that this- in our internal discussions, we have decided that this tool, the carbon budget, is focusing on the carbon dioxide emissions and we will continue to reduce other greenhouse gases and other activities that we are doing because they are part of our target by 2030. So, we cannot forget about them, but that is a question that is rising quite often here. Why only CO2?

Derek Garfield

Alright. There’s like a lot of things that I'd love to continue to ask you about, but I'm gonna shift gears a little bit if that's OK with you. Because in discussions with my supervisor and discussing my kind of analysis thus far, I'm trying to think of new ways that we can think about these carbon budgets or think about emissions-

Lise Nordin

Who is your supervisor?

Derek Garfield

Magdalena Kuchler.

Lise Nordin

OK yeah, I've met her. On the screen, yeah.

Derek Garfield

Yeah, OK, yeah, she's been involved in some of this research as well. But one of the things that I'm thinking about is, what if we shifted our perspective on greenhouse gas emissions to stop thinking about them simply as a waste that's at the end of its product life cycle and we start thinking about the carbon budget as a resource pool? And so, we can think about using our fuel resources, which is the majority of carbon emissions, as a means of harvesting this Ton of CO2 emissions. And what types of then policies and approaches and strategies might we use to then approach the problem in that way as a natural resource management question? And I don't know if you could, just again, hypothetically, and spitball and kind of brainstorm a little bit with me, what might that be like, maybe from your perspective, as a "miljöstrateg," what would that mean to try to adopt more of a natural resource management approach to carbon emissions.

Lise Nordin

Well, let's see if I- This was such a new thought. Do I understand you correct? That you're thinking that CO2 shall be seen as a as a resource that we can use for something positive rather than just the problem itself, right? So, then the first question into my mind is where do we have the need for CO2? We need CO2 for making- what do you call that, the bubbles in your soda? Yeah, so that is one use of CO2, but it is not that the amount is not very big for that. And where else do we actually need CO2? I mean, plants need it to grow, but we have so much CO2 in the atmosphere, so we don't need to add any CO2 anywhere. So, spontaneously I can't really think that there is any need for more CO2 to be seen as a resource. 'Cause I mean when you talk about CCS, the market, the technology today, are considering this as a waste that need to be taken away, if there was any value with the CO2, any other opportunities to use the CO2 for, then it will be used for that. Because CCS is very expensive. You don't get any need for it, just hide it away in the ground. So that's my thought. I like your creative thinking, but I couldn't find, I guess, what to use the CO2 for.

Derek Garfield

So, what I'm kind of thinking, and I'll just use this opportunity to kind of like, again, to brainstorm a little bit, because what I'm kind of thinking is not so much how to use it directly, in and of itself as a resource in that way, but to think again about that everything that we're doing, in which we emit carbon dioxide, is something that requires carbon dioxide as a fundamental resource.

Lise Nordin

Say that once again, just so I get it.

Derek Garfield

So, every everything that we do right now, that requires us to emit carbon dioxide to achieve it, it can be understood as requiring carbon dioxide, as a limiting resource, to produce whatever it is that we're producing.

Lise Nordin

Yeah, fossil energy mainly.

Derek Garfield

Yeah, exactly. And so, if we're going to be so focused on the carbon emissions, then my thought is

we might need to change the way we think about them to make them more valuable in and of themselves, because for some reason we're not interested in putting caps on importation or production of oil to try to mitigate this in some serious way. 'Cause you could have a carbon budget in that sense and say “well, we're only going to import this much fossil fuels into the region and then we'll use the economic markets to figure it out that way.” So how can then we make the emissions appear more valuable than what they actually are. And so, one of the kind of frameworks that I'm trying to think about this in just a little bit is- I'm not sure if you're familiar at all with these common pool resource management strategies? So if you think about the tragedy of the Commons and the thing with Hardin. And then there is this famous researcher, Elinor Ostrom.

Lise Nordin

Yeah, yeah, I read a bit of political science, my degree is in political science and environmental science, fun to talk about this again 10 years ago, yeah.

Derek Garfield

Right. And so, I took a course on natural resource governance here during my studies right now. And so, I'm curious to think about how we might actually approach the carbon budget under that type of framework, or commons management. Because we always talk about it as if it's a commons problem. That the atmosphere and its management is something that everybody can contribute to, but nobody has a defined responsibility over. And so, if you look in this kind of framework for different types of goods and services, then you have excludability and subtractability as your axes. And excludability means preventing people from accessing the resource, right? And subtractability is how much you can actually take out of this resource. And for public goods, like the kind of traditional commons that we think about, it's low excludability but also low subtractability. So, you're not losing out on any one person just taking from this system, so you can think about the public transportation system, police forces, and those things that we think about as public goods typically. But when you, my thinking is, this is my position and my analysis, that when you put a carbon budget, all of a sudden, now, you've said “well, this is how much of a resource there actually is. Is this much. All of the actors, in our region only, have access to this much of this resource. And we can actually measure this resource, and every time you burn 5 liters of gasoline, you're subtracting this much of that resource.” And so, then it shifts from just a public good, the “atmos-fill,” I like to call it, instead of a landfill, you know, a place where you just put your garbage, it’s the atmos-fill, you shift it into this common pool resource where we can measure and identify actors actually removing a limited amount of this resource. And so, then maybe what my suggestion is, probably going to be at some point in my discussion, that we might want to consider these types of management approaches as we think about carbon emissions and what would that mean then in the future for trying to make these political decisions to understand the carbon resource, carbon emissions management?

Lise Nordin

It makes a lot-

Derek Garfield

Yeah, the I think the trouble I'm running into is that you know I'm not an expert in this, it's just something that I've become familiar with recently. But I also think it's not the typical approach that a lot of municipalities are used to working with is commons resource management. And so, then you have this problem too, of politicians who also they only think about- I'm sorry for putting myself in here maybe a little bit too much and I kind of moved out of the position of an interviewer, but they are very focused on the economic budgets like you talked about as well and so then how would you then have a conversation with them about how to enact policies and regulations that are based on Commons resource management approach instead of a fiduciary type of approach which may or may not work.

Lise Nordin

Yeah. It makes sense to me when I hear your thoughts. It's a long time since I read Elinor Ostrom, but if I remember, it is believed that when the actors in an area have more knowledge of how their activities are influencing the resource or the total result, then there are more positive, more eager to make a change if they see their part in the bigger picture. And I would say that the carbon budget has, so far, worked that way in our region because it is more obvious for everyone that it is a limited resources and that, how big part of that resource that we can take, what is our fair part? And that we can make a difference in the big- I mean because now we can see that if we reach our carbon budget, and all other regions and municipalities and countries do that, then we reach the goal. So, it's a way of seeing our part in the big picture and that gives motivation. I think it gives responsibility but also motivation. So, when I when I described to you that early in the process that it was very important for our politicians to follow the model from Uppsala Universitet so that our results would be measurable, they wanted to be a part of something, not creating something themselves, but we want to have a framework that is similar to other frameworks so we can see our part in the big picture and to do our part. So, it has a lot of similarities I'm thinking.

Derek Garfield

You know, yeah, this having a measurable unit and thinking about that unit as a resource within a pool of resources, I think is what makes this kind of thinking even possible. And so far in my analysis, that's what I'm kind of leaning towards. Is that, again, carbon budgets do frame things in a certain ways, but it can also open up new opportunities for thinking about how to manage the climate.

Lise Nordin

Yeah, yeah. I have a memory that political science finding studies that people are much more willing to change their lifestyle if they find that other people do the same. So, it is quite possible to change people's way of living if they find that they are part of something bigger and that it is a fair transition. The fairness is very important. And that will be the same here then that the municipalities the politicians will be more- I'm struggling with my English, they're more willing to make a change if others do the same. And we are now, in the same line of thinking, our municipalities, we have 49 municipalities in Västra Götaland, and they are now invited to have their own carbon budgets. That is part of, let's say authors budget that we do this together. And so far, at least seven of them will do this this year. They have promised that they will adapt a carbon budget and that they like the thinking that we use these tools, this digital visualizing, the climate visualizer, that we do this together. So, the whole thinking of being part of something bigger opens up opportunities. They are much more willing, the politicians, if they are part of something bigger.

10.4. Transcript of an Interview with Herrljuna 2021/04/21

Derek Garfield

Okay, so the first thing that I'd like to ask you about, just generally about these carbon budgets is, what is it about the carbon budges that make it an attractive option for the municipality?

HERRLJUNGA

Det är väl att det är ju ett väldigt konkret verktyg. Det finns ganska få konkreta verktyg när det kommer till miljöstrategi. Det blir tydligt, handfast och lättare att ta till sig, liksom.

Derek

Can you speak a little bit more about what it is that makes it concrete as opposed to other types of frameworks?

HERRLJUNGA

Dels, så är det ju det att det finns ett sammanhang för koldioxidbudgetar. Det finns fler regioner och kommuner som har antagit sådana här. Så att det liksom, man kan jämföra vår kommun med hur andra kommuner jobbar eller har jobbat och hur utvecklingen har sett ut. Och sen också att det finns liksom fram forskade metoder som visar, även om det liksom inte är några absoluta gränser på någonting, så kan man ändå se att det finns en koppling mellan hur mycket koldioxidutsläpp vi gör och vad som händer framöver med klimatförändringarna. Man kan se också- man kan skala ner det till att titta på enskilda åtgärder och se hur påverkar det här koldioxidutsläppen. Så att det finns en tydlig röd tråd från den lilla enskilda åtgärden till en ganska abstrakt framtid, liksom. Med klimatförändringar som gör att- Så ofta när man pratar om miljöstrategi så är det så stora drag det så löst det kanten, man vet inte riktigt hur förändringarna blir. Medan, här har vi faktiskt- ja, men vi ser att koldioxidutsläppen ökar eller vi ser att koldioxidutsläppen minskar om vi förändrar åtgärden lite grann så kan vi se att vi får ett lite bättre utfall liksom. Och det gör att det blir möjligt att diskutera i enskilda åtgärder och liksom förändra enskilda åtgärder utifrån en ganska abstrakt framtid, liksom i förhållande till en abstrakt framtid. Och det blir också även om det finns en stor eftersläpning i statistiken så blir det möjligt att liksom följa upp och att. Få återkoppling på hur har utfallet blivit på något sätt. Det är också ett ganska- jag tänker att det är ett starkt signalvärde. Att man säger att ja, men nu väljer vi anta den här, då är det inte bara, liksom lösa formuleringar om att vi ska tänka på hållbarhet och vi ska tänka på miljön när vi fattar beslut utan men då kan man se att vi ska minska det. Det finns en siffra på att vi ska minska så här mycket liksom. Även om den är i princip bara att man säger att vi ska minska så mycket vi kan, så är det ändå en tydlig signal från politiker att det här är någonting som är viktigt.

Derek

Right. I'll be asking you just to anticipate just a little bit maybe, but why is it that having a specific number makes the emissions easier to work with?

HERRLJUNGA

Det är väl på något vis att vi är vana vid att jobba med siffror. Vi är vana vid att jobba enligt ekonomiska budgetar och även om de är mycket mer handfasta och konkreta med en direkt återkoppling så finns det ändå- men det gör det lättfattligt, det gör det lättare att ta till sig. Man kan inbilla sig i alla fall att det är, liksom, absoluta tal det handlar om även om det sällan är det. Det gör det lättare att kommunicera för man kan illustrera det i grafer och man kan liksom följa en utveckling över tid. Snarare än att säga att det var mycket eller lite så kan man säga att det var dubbelt så mycket och det här året som det var det här året eller vad det nu är eller den här åtgärden ger dubbelt så mycket utsläpp som den här åtgärden. Inte bara den här åtgärden ger mer utan. Man får man får någon form av storleksförhållanden liksom att förhålla sig till. Man kan relatera det till andra värden också då till ekonomisk kostnad till exempel. Dom kan förhålla sig till varann på ett annat sätt.

Derek

Can you elaborate a little bit more on what that relationship might be? Because the economic aspect of it is something that a lot of individuals that I've interviewed thus far have talked about. That there is a desire to connect the carbon budgets to economic budgets or economic processes. Can you talk a little bit more about that?

HERRLJUNGA

Alltså, den ekonomiska budgeten är ju ständigt närvarande i kommunal verksamhet. Den utgör ju på något sätt absoluta ramar för vad vi kan göra. Och därför måste egentligen allting som vi gör förhålla sig till det. Det måste bli greppbart när man fattar beslut. Vad får det här för konsekvenser till de absoluta ramarna som vi har? Och ekonomisk budget är ju också. Den är ju på kort sikt alltså. Den är ju från år till år. Så där är det väldigt tydligt. Men ramen är väldigt tydlig, alltså. Även om man kan säga ofta eller ofta säger man ju liksom att Klimaten är ju en absolut ram för vår mänsklighet, men det är så stort och långt bort och långt in i framtiden. Så att det här blir ju ett sätt att koppla att liksom få en förståelse för vad innebär det egentligen? Och också att jämka samman alltså. De ekonomiska ramarna utgör ju någon slags ram eller kopplar ihop all verksamhet i kommunen. Och då kan man liksom genom dem väl väga åtgärder för klimatet mot åtgärder eller insatser i vården, eller vad det nu kan vara som är på mer kort sikt. Det blir ett sätt att liksom förhålla saker till varandra. Om du förstår hur jag menar. Ja, jag tror att det är det handlar

mycket om. Att man måste kunna jämföra. Eftersom resurserna är ändliga och ofta väldigt begränsade i förhållande till vad vi skulle vilja göra, både utsläpps resurserna eller vad man ska säga och de ekonomiska resurserna, så måste man ju göra hårda prioriteringar. Då måste man ha någonting som gör olika beslut jämförbara liksom relaterbara till varandra.

Derek

Yeah, okay. I see how that makes a lot of sense for why people would want to connect these two ideas. To extend maybe a little bit wider the net that we are talking about, and maybe bring in some other types of resources, because you have mentioned economic resources and emissions resources, which I thought was really nice because I like to think about carbon budgets in that way, that it creates an emissions resource area. What are some? One of the things that I'm trying to understand is how we can think about emission differently by using a carbon budget. And so, maybe to try and relate it to other types of resources is a useful way to do that. So, could you see some connections between, again this kind of emissions resource that is created by the carbon budget and say, the city's water services?

HERRLJUNGA

Jag är inte säker på att jag förstår, eller? Alltså. Jo men. Jag tror jag ska resonera lite, men jag tror att du kommer att få ställa frågan igen, men jag tror mycket riktigt du har eller det är nog där det ligger att det gör. Koldioxid budgeterna gör det liksom greppbart att även här har vi begränsat med resurser. Vi har liksom den här mängden utsläpp att göra. Och det gäller att vi lägger de utsläppen på rätt ställe, precis som det gäller att vi och att vi värnar om de resurserna. Så att vi använder dem så effektivt som möjligt, precis som med en ekonomisk budget eller som med när det kommer till vattenresurser, alltså dricksvatten resurser. Att vi ser till att vi vårdar dem så att de är hållbara under en lång tid. Så att vi ser att sånt som vi gör nu påverkar vilka möjligheter vi har om 10 år, liksom. Också att man inte kan- Jag tänker att det när det kommer till vattenresurser så, precis som med koldioxidutsläpp, så handlar det ju om att man ser att det inte är hållbart att bara skjuta problemet på framtiden utan vi måste värna om de här resurserna redan idag. Vi kan inte komma på om 20 år att oj, nu har vi byggt så mycket så att nu har vi inte dricksvatten längre när klimatet blir varmare. Utan vi måste tänka efter före liksom. Vi måste tänka igenom så att när vi bygger ut vårt samhälle, att vi vet att vi kan ta hand om avfallet. Vi kan göra det på ett sätt som gör att vi kan resa även i framtiden. Vi ser till att vi inte förorenar dricksvatten, resurserna eller att vi inte bygger så att vi rent av kanske tömma dricksvatten resurser för att vi vill liksom dränera dem av någon anledning, så. Och att vi bygger ett samhälle som är rimligt med avseende på den mängd koldioxidutsläpp som vi kan röra oss med liksom. Så att vi ser att i framtiden om man inte kan fortsätta åka privat bil som drivs med bensin, att vi ser att det ändå finns en rimlighet i att bo på den här platsen, även om 25 år liksom eller 30 år eller vad det nu kan handla om.

Derek

What are some of the processes or measures that the city uses to manage a resource like water? What is it that the city is doing to make sure that you're not overexploiting the limited quantities of that resource that exist?

HERRLJUNGA

Ja, för det första gäller det ju att se till att det är någon som har koll på det, alltså att det finns en när det gäller vatten till exempel så att det finns en VA-huvudman som är ansvarig för att hålla koll på vattnet. Och att vi samverkar det också med andra aktörer i närområdet. Att vi samverkar med länsstyrelsen som har koll på regional nivå eller vattenmyndigheterna. Och att vi samverkar med våra grannkommuner så att vi ser till att vi har ungefär- att inte dom tömmer ut våra vattenresurser av någon anledning. Eller att inte vi gör så mycket utsläpp så att deras vattentäkter blir förstörd eller vad det nu kan vara. Och det blir ju samma sak när det kommer till Koldioxid. Att på något sätt måste man bygga upp ett system, dels för att kartlägga vilka utsläpp gör vi och att kunna- Ja, men när man jobbar med vattenfrågor till exempel då handlar det ju först om att kartlägga vilka vattenresurser har vi, vilka använder dem, och hur mycket av det använder man, och har de ett tillräckligt skydd, alltså? Ser vi till att det är inte plötsligt kommer någon som släpper ut en massa olja precis där. Och vad händer- och också att man gör en riskbedömning, vad händer då om det ändå skulle bli en olycka? Vad kan vi ta till då? Ska vi köra vatten dit, har vi resurser för det eller ska vi koppla ihop vattentäkter på något sätt, eller hur gör man? Och jag tänker att en

koldioxidbudget är ju liksom ett första steg i att göra den här kartläggningen. Vad är det egentligen för utsläpp vi gör? Och de andra stegen som man redan har kommit till i, när det kommer till vattenfrågor, dit har man liksom inte riktigt kommit än. Att vi ser vad händer om vi ändå överskrider eller vad händer om vi måste lägga väldigt mycket mer koldioxidutsläpp på en viss åtgärd för att av andra anledningar behövs. Var kan vi i så fall minska den? Där är vi ju inte än och vi har heller inte något system för att kontrollera, att det inte blir oväntat mycket utsläpp. Ja, men vi har ju egentligen inte någon som är tydligt ansvarig på det sättet som man har för vattenfrågor. Men koldioxidbudgeterna är liksom första steget i det att se att det här är också en ändlig resurs liksom.

Derek

What type of background knowledge does somebody need to have to successfully fill that type of position where you would be responsible for a carbon budget?

HERRLJUNGA

Oj, det var en bra fråga. Ja. Alltså, man måste ju ha ganska bred kompetens. Jag känner egentligen inte att jag har rätt kompetens för det. Men jag tänker att man behöver mycket- det jag saknar i alla fall- Jag kan ju bara säga vad jag känner att jag inte har koll på, och det är ju mycket tekniska frågor. Alltså, hur kan man lösa byggnation på ett mindre koldioxidslukande sätt. Vad är rimligt att införa i för krav på arbetsmaskiner, i upphandlings lägen liksom. Hur kan man styra upphandlingen? Och mycket är ju upphandlingsfrågor liksom. Och en kunskap om hur kommunens verksamhet, olika inköp, olika produkter olika, vad det ger för utsläpp helt enkelt. Så, åtminstone det jag känner att jag saknar är ju en teknisk kompetens som behöver man ju. För att förstå det så behöver man ju en miljövetare bakgrund också alltså. För att förstå sammanhanget, förstår utsläppen så att det inte bara handlar om koldioxid, även om det är det vi har lyckats kvantifiera och skaffa ett sammanhang och ett ramverk för. Så är det ju i våran kommun så är det kanske andra gaser, växthusgaser, metan till exempel, som också är viktiga att hålla koll på liksom. Och där behövs ju också kunskap, liksom om näringslivet i kommunen, om jordbruk, att kunna föra dialog med näringsyrkare med lantbrukare till exempel. Ja.

Derek

It’s a tough question and that’s why I like to try to ask it. Because, as you’ve identified, it's something that will probably be important in the future, to know what we're expecting people to do. And so, I'd like to try and turn that question in a different way and what we expect people to do. What are the different expectations that a carbon budget puts on different member of the community? Maybe within the city itself, but also how are citizens, residents, within the city supposed to use a carbon budget, or maybe they're not? Can you talk a little bit about that?

HERRLJUNGA

En sak som jag tänker på den förra frågan, om vad man behöver för kompetenser, är mycket också kommunikation. Alltså att- och det hänger ju ihop med den här frågan också väldigt tydligt, att kunna få med sig folk att kunna föra dialogen med folk, liksom. Men vad vi har för förväntningar på invånare utifrån en koldioxidbudget. Så som koldioxidbudgetar utifrån ett geografiskt perspektiv är uppbyggt så är det ju inte möjligt att liksom läsa ut vad kommer från den kommunala verksamheten och vad kommer från medborgarnas utsläpp. Så då är vi ju på något sätt beroende av att medborgarna också drar sitt strå till stacken för att komma någon vart. Alltså för att lyckas hålla nere utsläpp. Och det enda vi som kommun kan göra är ju egentligen att visa på att vara en föregångare och att visa på att vi ser det här som viktigt och relevant och då hoppas på att vi också får med oss. Vi kan ju inte tvinga våra invånare att minska på sina utsläpp. Åtminstone i väldigt begränsad mån. Utan vi får ju på något sätt lita på att de också förstår att det här är någonting vi behöver göra tillsammans. Sen tänker jag att en stor viktig poäng med koldioxidbudgetar, jag har tilltro till att inte alla men väldigt många ser att det här är en viktig fråga. Och en koldioxidbudget blir ju också ett sätt för invånare att få koll på hur ser det just i Herrljunga. Så att de kan sätta press på politiker. Så att de kan också säga att ja, men hur, hur tänker ni när ni gör den här investeringen? Är den verkligen hållbar om man ser till koldioxid budgeten? Alltså de här kommunikationen- Jag tänker att en visualisering av koldioxid budgeten blir viktig för att göra den greppbar, så att man kan förstå att det faktiskt spelar roll vad vi gör liksom. Och då är ju min förhoppning att människor ser att om jag väljer att- Min förhoppning är ju dels att folk ska ifrågasätta oss

på kommunen och dels att de också ska se att det här är något vi gör tillsammans, att de ska tänka efter Vad kan jag göra för att bidra till att Herrljunga uppnår sina mål i koldioxid budgeten. Sen är det ju inte det här det enda målet vi har. Alltså den prioriteringen är inte lätt att liksom prioritera mellan olika mål. Och där gör man olika bedömning och för den enskilde kanske det i vissa fall, blir inte logiskt eller rationellt att göra så stora uppoffringar som man skulle behöva ur ett enskilt perspektiv för att uppnå budgeten. Men där- det blir ändå på något sätt ett sätt att illustrera helheten. Budgeten blir ett sätt att illustrera helheten. Göra det mer rationellt.

Derek

Earlier we talked about the number and having a concrete number as a way that carbon budgets help us to visualize this emissions problem. Are there other ways that carbon budgets help us to visualize the emissions problem in a certain way?

HERRLJUNGA

Ja alltså, åtminstone så som det beror ju lite på vad man gör med koldioxid budgeten, men om man tittar på den modell som klimat sekretariatet har så har ju de ett konkret verktyg som visualiserar vad händer om vi byter ut alla bensinbilar eller minskar med så här mycket i fordonsflottan under de närmaste 5 åren? Vad händer med koldioxid budgeten då? Eller vad händer om vi istället bygger ut en stor fabrik eller vad det nu kan vara? Och det blir ju ett sätt att liksom kunna se helheten. Att kunna förutspå framtiden lite grann. Sen blir det ju också så i diskussionerna när vi har pratat om koldioxid budgeten så gör det ju alltså det här Parisavtalet blir ju väldigt konkret. Där har man kommit fram till för att samhället ska klara sig på lång sikt, för att vi ska lyckas upprätthålla samhällsfunktionerna på lång sikt, så måste vi hålla oss inom det här utsläppt utrymmet. Och vi säger att då behöver vi minska med 16% i år, till exempel. Och då har jag ju bara i de diskussionerna med politiken, till exempel fått och reaktionen att ja, men om det då inte är realistiskt att vi ska minska 16% per år, det du säger är alltså i princip att vi ligger väldigt risigt till. Det är egentligen mer eller mindre kört. Och det gör det ju väldigt greppbart. Alltså, Parisavtalet blir här och nu. Vi förstår att- Jag upplever att det blir ett bra underlag för diskussion för att förstå att vi kan inte bara vänta på att någon annan ska göra någonting eller att det ska teknikutvecklingen ska lösa det här. Utan vi måste börja agera på en gång om vi ska ha en chans, liksom. Och den gränsen blir ju mycket mer nåbar.

Derek

So, the carbon budget makes the issue itself more present? More bounded in time and space to the municipality today?

HERRLJUNGA

Precis. Ja om det illustrerar eller kan du ställa frågan en gång till?

Derek

I was wanting to make sure that I've understood what you've said about what the carbon budget is making us visualize. And what I'm understanding is that by taking the emissions and making them local, putting a boundary around them that has to do with the municipality, and putting a number on that for a total amount which you can emit, it makes it current. It makes it immediate and something you can work with now. As opposed to something that's supposed to just be in the future.

HERRLJUNGA

Precis. Och det där, tror jag, är väldigt viktigt just att man får också en känsla av, dels att det är viktigt, men också att vi faktiskt kan göra någonting. Alltså det ger ju en handlingsförmåga ändå, även om man sätter en gräns på saker och ting, så genom att man gör klimatförändringarna, kopplar dem till nu tiden och till den här platsen på något sätt, så ger man också mandat till politikerna att agera på det på något sätt. Visar dem att ja, men ni kan faktiskt genom att fatta olika beslut påverka utfallet i framtiden. Det är inte bara någonting som vi får hålla tummarna för att det ska lösa sig, utan ni har möjlighet att påverka vad som händer.

Derek

Okay, yeah. I'd like to do kind of a thinking exercise with you, I haven't done this- like kind of to brainstorm a little bit with you. Kind of just for fun but I think that can maybe inform my analysis and the information that I'm working with already. Because, for me, one of the things that seeming to be really important is this

fact that emissions are a commons problem. If you're familiar with that word in English? And so, as you've said, and as many other interviewees have said, it becomes hard for the municipality to have a direct, regulatory control over the residents or the businesses, or what have you, within the municipality. And so, a lot of them feel that very much that the only tool they have is to communicate to residents about the carbon budget and hope that they do some kind of self-control and self-regulation.

HERRLJUNGA

Ja alltså man kan ju kommunicera, men man kan ju också liksom göra det lättare eller svårare för folk att göra rätt.

Derek

By what means? What might you do?

HERRLJUNGA

Genom hur man utvecklar infrastrukturen till exempel. Där finns ju jättemycket och, nu säger jag mot mig själv lite grann, för att vi har jätteproblem med att utveckla infrastrukturen på landsbygden, eller cykelinfrastrukturen ska jag säga. Men vi kan ju välja genom hur vi satsar, om vi satsar mycket på att bygga i närheten av tågstationerna till exempel. Att vi ser det som viktigt. Ja, men då blir det ju lättare för folk att ta tågstationen än om vi bygger långt ut på landsbygden där enda transportmedel är bil och att vi sprider ut all bebyggelse så att det inte finns underlag för att ha kollektivtrafik. Eller att vi, till exempel, lägger resurser på att utveckla laddinfrastruktur. Nu har vi ett samarbete i Sjuhärad där vi försöker hitta en strategi för laddinfrastruktur.

Derek

For electric cars?

HERRLJUNGA

Ja, precis. Då har vi inte alltid resurser att bygga dem själva, men bara genom att vi visar att här är strategiska platser att byggas som är identifierat eller här ser vi det som önskvärt och tillåta företag att bygga till exempel. Så skapar vi ju möjligheter för folk att köra elbil istället för att fortsätta med bensinbil eller att byta till gasbil eller. Alltså, det får ju effekter. Vi kan ju kommunicera, men vi gör ju också saker som gör det- allt vår verksamhet, eller nästan all vår verksamhet, påverkar vilka möjligheter människor har i sin vardag. Vad som är smidigt och nåbart liksom. När vi får- vi har, till exempel, ett energibolag som har fått i sina ägardirektiv att de ska promota solel och dom är väldigt kunniga på solel och då har ju det också gett effekt att många har installerat solel. Hade vi inte överhuvudtaget funderat över de frågorna och bara väntat in att folk förhoppningsvis kommer att fråga om hur man gör och då börjar att leta, då hade det ju inte utbyggnaden gått lika fort. Så det är ju inte bara det att man sitter passivt och väntar och säger till folk, titta här nu. Ni kan också göra saker för koldioxidutsläpp. Även utan man kan också gå före och göra det enkelt. Men nu avbröt jag dig när du höll på att presentera upp eller övningen, men.

Derek

No, those were the things that I was interested in as well is what types of actions the city can take and be proactive about. Because as you've said, they can have a direct effect on citizens, and so what I'm trying to understand those types of questions is, what then does the city expect of citizens and the people who are being governed under a carbon budget, more than any kind of particular measure you might take. Those are interesting as well though, to see what types of strategies the cities are interested in pursuing. So, what you've said is that the city does have a great degree of ability to impact residents' emissions by doing things that cities are already doing with Samhällsplanering och översiktsplaner. That leads me to another question then. Is the carbon budget also intended to be directly connected to something like the översiktsplan within the Kommun?

HERRLJUNGA

Vet inte än. Men jag tänker mig att på något sätt måste den ju var det. Den är ju inte framtagen som ett underlag till översiktsplanen utan den är väl framtagen snarare som en del av kommunens övergripande mål. Eller nu har vi ju inte tagit fram någon överhuvudtaget, men tanken är väl att göra det till en del av målarbetet liksom.

Derek

Is that discussions within the miljönämnd or kommunstyrelsen?

HERRLJUNGA

Vi har inte riktigt haft den diskussionen än. Jag sitter direkt under kommunstyrelsen, men eftersom vi inte har beslutat hur framtagandet ska se ut än, alltså, vi har inte beslutat vad den ska ha för funktion riktigt. Så att det här är mer mina tankar som tjänsteperson vilket ju är viktigt att ta med sig att det inte är någonting. Vilken funktion koldioxid budgeten ska ha inte färdigt än, det är inte beslutat än. Men om det ska ha effekt så måste det ju utgöra åtminstone ett planeringsunderlag för

alla planer tänker jag. Alltså både översiktsplan och när man beslutar om andra strategier för andra verksamheter. Även hur man bedriver skolverksamheten, eller vad vi gör med våra fastigheter påverkar ju koldioxid budgeten, liksom. Så att den måste ju finnas med i bakhuvudet hela tiden på något sätt.

Derek

Great. I'd like to talk a little too about, before we wrap up, were quickly running out of time I guess for our allotted hour. The decision to adopt a carbon budget for Herrljunga is still within your area, you're working on it right now, but the decision was made to take the Klimatlöften from Klimat 2030.

HERRLJUNGA

Ja vi hade en motion, eller, VGR påbörjade ju sitt arbete med att ta fram en koldioxidbudget under 2019 om jag minns rätt. Då kontaktade de Uppsala universitet och fick eller på påbörjade det arbetet. Och i samband med det så var det en politiker hos oss som lämnar in en motion om att Herrljunga skulle göra samma sak. Då förstod vi det som att den här VGRs budget skulle vara relativt enkel att plocka ner på lokal nivå och använda i princip rakt av. Så därför så sa vi att men vi avvaktar tills de har antagit sin budget. Men under tiden då så kom de här klimatlöfterna och då var det ganska naturligt att- eller det var politikerna relativt överens om att det här är ett vettigt klimatlöfte och anta för det här är någonting som vi ändå känner är relevant utifrån våra hållbarhetsmål och våra övergripande mål. Så då sa man att ja, men det antar vi. Vi har börjat fundera på frågan redan liksom. Men vi har inte bestämt- det är ju en läroprocess för oss allihopa. Det är jag som har fått den här frågan på mitt bord. Jag har inte jobbat alls, med koldioxidbudgetar tidigare. Så att vad den har för funktion, hur den ska fungera och hur man kan ta fram den, det är någonting som vi har fått lära oss efter hand liksom. Så att det vi ska besluta här näst är ju att ge någon i uppdrag att göra själva sammanställningen av rapporten och att hitta vad är det för budget vi har att röra oss med. Och när man väl har det så får man ju besluta om huruvida den ska gälla och hur den ska användas så. Så det beslutet inte är fattat än och den diskussionen har inte riktigt landat.

Derek

You mentioned just now that it's your responsibility and that you've never worked with carbon budgets before. How do you deal with that as an official within the municipality? How do you deal with being presented with a new way of working with and understanding these problems but starting basically from maybe zero?

HERRLJUNGA

Ja, jag försöker så gott jag kan läsa på. Dels läsa litteratur och sen också prata med framförallt andra kommuner och regioner som har kommit lite längre som har behandlat den här frågan på redan tidigare. Borås kommun har ju också tagit fram en koldioxidbudget, men nu ur ett konsumtionsperspektiv, så har pratat med han som har jobbat med det. Och jag har pratat med- så när jag är också deltagit i- VGR har ju anordnat workshops och seminarier om koldioxidbudgetar där jag har lärt mig väldigt mycket. Och så får man ju- Ja. Ja men dels- ja, det är ju- det jag försökt att liksom sätta mig in i vad är det här för någonting? Vad har de för funktion? Vad är bakgrunden till att man tar fram dem? Både genom litteratur och genom att prata med andra som har jobbat med frågan och genom att vara med på de här seminarierna där jag har fått kunskap från forskarna och från personer med kunskap om koldioxidbudgetar. Jag har pratat dels med Borås kommun och dels med Vårgårda där man valt att inte ta fram koldioxidbudget. Och så har jag pratat med en tjänsteperson som tidigare jobbade i Ale kommun och

nu jobbar någon annanstans, jag har glömt var, men som också har liksom gjort en enkel sammanställning utifrån från officiell statistik så och hur de har valt och hantera det.

Derek

So, you rely a lot on a network of people who are also working with carbon budgets?

HERRLJUNGA

Ja precis. Och det är ju en svår situation alltså. Jag jobbar ju i en liten organisation där det finns inte någon som har särskilt kompetens i de här frågorna, utan jag blir den särskilda kompetensen. Vilket är lite skrämmande, men det är också en frihet att man- men man får bara lita på att det blir så bra som möjligt. Och det nätverket blir ju väldigt viktigt då. Av andra som jobbar med den här typen av frågor och där det i vissa kommuner finns personer med särskild kompetens eller som åtminstone jobbar heltid med de här frågorna. Jag gör ju inte det heller. Och så får jag ju försöka förmedla också var- till politiker får jag ju också försöka förmedla var gränserna för min kompetens går. Alltså vad jag vet och inte. Vilket inte heller är helt lätt. Ja.

Derek

I'm a little bit curious, not which politician, but which political party put forward the motion to adopt a carbon budget?

HERRLJUNGA

Det var Socialdemokraterna. Sen har jag inte uppfattat att det har funnits något tydligt motstånd i något politiskt parti, mot att ta fram det här. Men som sagt, jag har inte varit med i- vi har inte haft någon diskussion. Vi har bara haft diskussion i ganska små politiska sammanhang och informella politiska sammanhang än så länge. Vi har inte haft någon stor diskussion i något formellt politiskt sammanhang, så jag har inte hört hur resonemangen har gått i de olika partigrupperna. Men jag har inte uppfattat det som en särskilt kontroversiell fråga.

Derek

That’s interesting.

HERRLJUNGA

Ja faktiskt. Jag håller med. För det hade jag nog förväntat mig att det skulle vara alltså. Det blir ju ett sätt att begränsa sig ändå. Och om man ska lyckas uppfylla den så kommer det ju att ha tydliga konsekvenser för vilka beslut man kan fatta. Det kommer att ha konsekvenser på budgeten, den ekonomiska budgeten. Så jag är också förvånad över att det verkar vara så pass överens om att det här är någonting som vi ska ha.

Derek

Do you think that there's a lack of awareness over what the implications might be of having such clear boundaries about development?

HERRLJUNGA

Ja, det är jag. Antingen det att man inte förstår vad det innebär eller att man- Jag är lite rädd att man inte kommer att- att man tänker att det är någonting som vi antar oss och är det bra att vi har en budget men att man inte låter det ha den effekt som kanske skulle behöva för att vi ska lyckas uppfylla det. För om man ska lyckas med det så kommer det ha stora effekter, både på att man behöver göra ganska stora åtgärder, men också på inte minst att man inför varje beslut behöver ta fram underlag om det här. Alltså bara det är en stor grej i sig att få med underlag på, vad har det här för effekt på koldioxidutsläppen när man diskuterar parkutbyggnad eller vad det kan vara. Så det ska bli spännande att se vilket genomslag det får.

Derek

Ja, verkligen.

HERRLJUNGA

Om man faktiskt tar hänsyn till det, eller om man bara säger att ja, men visst det är väl bra om vi minskar på utsläppen av koldioxidutsläpp, men inte riktigt ta det på allvar.

Addendum

After ending the interview, we had a brief discussion about my preliminary findings and a recap of the interview during which I asked if it would be possible to follow-up on something that they had mentioned early in the interview. Consent was given to record this response.

HERRLJUNGA

Du frågade om det här med att jag ser på utsläpp som att vi har utsläppsresurser eller att vi har liksom ett- Och det är ju någonting som jag känner att jag har den bilden har jag väl skapat för mig själv genom att jag har fått större och större förståelse för tanken bakom koldioxidbudgetar. Att vi har ett begränsat utrymme. Man ser på att det är de ackumulerade utsläppen som är det viktiga. Och då skapas ju också på något sätt ett tak, en ram, för så här mycket kan vi släppa ut. Och så fort man har en ram för hur mycket man kan släppa ut då får man ju på något sätt, se det där som en ändlig resurs. Då blir det att likställa med en ekonomisk budget eller med att vi har grundvattentäkter med en viss mängd vatten även om det fylls på i viss grad så har vi ändå de här resurserna liksom. Eller vi har de här personalresurserna som kan göra allt det här jobbet som vi behöver göra. Och det är ju tänker jag det som koldioxidbudgeterna tillför till tankemönstret och till förståelsen att det inte handlar om hur mycket vi släpper ut, att ett visst år måste vi ha slutat släppa ut, utan det handlar om att under hela tiden så har vi ett visst utrymme att röra oss med liksom. Vilket gör det mer relevant vad vi gör idag. För vi kan inte fortsätta, alltså om man säger så som vi har haft miljömål tidigare, att man säger att 2045 ska det vara netto noll utsläpp. Ja, då kan man ju fortsätta släppa ut en massa fram tills 2044, och så 2045 släpper man inte ut någonting för man stänger ner samhället i princip. Men då har vi ju redan rört oss utanför det där utrymmet liksom. Då har vi förbrukat alla resurser.

10.5. Transcript of an Interview with STENA AB on 2021/05/03

Derek

So, the first thing that I'd like to start asking you about is with local carbon budgets, or maybe even carbon budgets more broadly, is how do you understand the relationship between the work that your company is doing and with carbon budgets? Or how do you put these two together? How do they work for you?

STENA

I think having a local carbon budget, if it's well communicated and well known among the people in the region or in for that local area where the carbon budget is set, it sort of puts a peer pressure I would say. So, it in one way it facilitates the companies work to reduce their emissions because it becomes sort of a peer pressure among the local companies and those active in that region. And so that's in the best of senses. But with that said I also have to say that most of our operations is in shipping, which is outside of a local carbon budget though.

Derek

What does that mean then for your operations? So, does that mean that your emissions are falling outside of what should be counted towards a local carbon budget?

STENA AB

Yeah, and are not possible to regulate in the local carbon budget and a lot of the initiatives done on a local level does not really facilitate the global operations. And that's why I think, or from our perspective and my personal perspective, I think a local carbon budget and those sort of initiatives like the one we have in VGR have a huge impact if you are active here. If you are within the

municipality or the public sector or if you're a small company basically operating in this region. But whereas if you are global, this is just one local framework or initiative that you need to rely on or relate to in one way or the other. And so, in that sense it become less efficient because it's only one out of many. In regard to if you were only having your operations in VGR and you had all of your customers and everything here, then it's easier to take a full ownership and really step into the vision and the work because you see that this is a holistic- all of our work.

Derek

So how do you negotiate that then? Being a global company? Why is it relevant for you that VGR has a local carbon budget?

STENA AB

Although we are global, we're very proud of our roots and our owner family have their roots here in Gothenburg, and that's where we still have the headquarters, that's where the owner family still lives. And I won't say that the most of our employees work here, but we have all the head office for our different business areas here. So, it's sort of aligns with where we have our roots and obviously if it's good for Gothenburg and good for the Gothenburg area, we believe it's beneficial and good for the companies, including us.

Derek

OK. Do the carbon budgets come in a governance aspect at all for the company?

STENA AB

I would have to say that until I became part of the Klimatrådet here in VG, we had hardly come across local carbon budget at all I would have to say. Because I think most of the operations are just outward looking and it's all about, especially in shipping, it's all towards either IEU or IMO. And so in in a sense, perhaps you could see that as a failure in communication to the larger companies from the region to communicate and get the more larger companies important to communicate that to them. Because there are already other governance measures and targets that have impacted our operations and the way we work previous to this. But just having the information that there is now and obviously something that we want to support, gave more fuel in that direction.

Derek

I'm not an expert by any means and kind of a greenhouse gas accounting, but is that something that that Stena uses as part of an emission reduction strategy?

STENA AB

Yes. That's a short answer. But we don't do it as a group. We have a very strong core value is a delegated business acumen, so although we tried to drive and do something centrally, the most work is done in the different business areas. So, Stena Line have set their goal of when they are to reduce their emissions with a certain percentage. And Stena bulk(?) have done their own and Stena Property have done their own. And just to say Stena Property, in regards to the local corporate budget, although they're a national company, they're having their main operations in Sweden, but in Stockholm, Gothenburg and Malmo. So, in that way, even though they're one company, they have three different regions to apply to and feed into. Whenever you are scaling up in size, company wise and operations, a local carbon budget is just one out of many that you try to adhere to from a central perspective. So then I think it's always more important that you look like we have the goal clear. We know that there's no ‘planet B’, so we know what we have to do. But then you have to take ownership of ‘what can we do?’ and in the field of our impact and our operations and be more true to that. Because then you would get a larger leverage and a larger breakthrough, I think, if you just sort of- all the- but those

sort of initiatives in the outside, and saying outside as being the region or the municipality or nation, that would help you though, but it's more important even than if you're operating in several regions, countries, that you have clear ownership yourself of what results you want to see and what targets you want to work towards.

Derek

Right, OK. To focus a little bit back on the carbon budgets, I'm seeing already that that local carbon budgets is something that's kind of difficult, as much as you might be interested in adapting to it, there's kind of a limitation there because of the international and global nature of what it is that the company does. But what is it that the carbon budget does differently, that makes it, maybe, perhaps, this is all kind of up in the air, still useful as a way to see carbon emissions as a problem? Why is the carbon budget different?

STENA AB

I think one way is just that it's tried to make it tangible and putting it into a bit of a more- getting it closer as an individual. It's something big and rather abstract to think of the 'world global emissions' and 'how much we need to cut our emissions globally' but sort of breaking it down to a smaller area, local area, that's closer to where I live that's closer to where- I think it's a way to make it more personal and thereby, perhaps, state the urgency and make people wanting to fill in and work to towards that. And I would also say that one thing that I see has come out from Gothenburg and VG, is that having a local carbon budget, perhaps also, is a tool to engage and stir up more partnerships with local actors. Because you have this local target that we're working towards here in VG. OK then we need to have- also here we have four focus areas, which one is transport, and I think it's easier to sort of form partnerships in the local field for some things, and I think a carbon budget could be a good platform to start off those partnerships. Because the challenge ahead of us, when it comes to the climate and reducing our emissions, is huge and not something that just one person can do or just one company can do but we need to work together. So, having a carbon budget as a platform to engage and start up different partnerships and collaborations and how we can use each other, both in terms of expertise and knowledge and previous experiences, but also having each other projects and 'how can we fit into each other business models' and I think those kinds of cooperations could be positive things that that come out from the local carbon budgets.

Derek

What is it about the carbon budget that facilitates that type of partnership and collaboration?

STENA AB

I think that perhaps it stirs up a larger ownership because it's close to you. It's close to where you have your operation. I know in Gothenburg Volvo has done a lot of different projects. They're global, just like we are, and even more global, they're larger than we are, but it's their home arena. That's where they have their roots. And they want to show off perhaps. Use their home arena as a pilot project field just like we have done in certain of our pilot projects with trying new fuels for our vessels. We've done it on the vessels that are operating out and in from or calling Gothenburg port, because they're closest to where we have the head offices, we have our technique department and also the partnerships that we already have here in the area. In the same way I think a local carbon budget creates perhaps the strongest sense of urgency, if it's closer to you personally as an individual as well.

Derek

OK. One of the things that I'm trying to understand a little bit better is what types of knowledges carbon budgets rely on and who has access to those types of knowledges. So, from your perspective, who do you find that it is that's communicating about carbon budgets, what type of knowledge and

expertise do they have?

STENA AB

Well, I would say that who are the owners of it is the Region and the Länstyrelsen, and they're trying to engage more and more companies, and one way is to have this Klimatrådet where we have academia, and we have companies, and we have the public sector involved. Obviously, they have knowledge relating to emissions and the different kind of things that we need to do, like hard expertise on climate change, but I also think it's cool because they, as we have done here in VG, they have identified four areas which is transport, it's buildings- I guess you have read through all of this- and it's food, and it's product and services. But then you can attach sort of expertise into each of these four areas because those are important areas to work with if we are to reach the goal. And then you can build on networks and other people and companies and people who have knowledge in this. So once again, it's a platform more to cooperate and partnerships. But you need to have it. Yeah, so I don't know if that was the full answer to the question.

Derek

Yeah, I think I'm understanding what you're saying, and I'll just reiterate in my own words, and you can tell me if I'm following what you're thinking. What I'm kind of getting is that the local carbon budget of VG is one aspect of this broader picture towards carbon emissions reduction. And so, one of the things that has become helpful for you and the company then is, it's become more accessible through these different kind of sector approaches as a way to tackle areas of responsibility? Things that might be more applicable?

STENA AB

Yeah, that's right. And I think that's also a way, like we got engaged since we have rotating- and your supposed to be sitting in the Klimatrådet for two years, and they wanted to have a company that represent the transport sector. So, although we are present as Stena Group, we are present in many different fields, but we are present in Klimatrådet with the transport operations hat on us. And I think because then it's easier to engage people because they feel that they actually have something to contribute with, that we have experience in this field. If it was just 'oh, we're having a carbon budget and we want to reduce our carbon,' it becomes a bit perhaps too broad, to fluffy and not so concrete. And it's perhaps harder to get companies to buy in and to be active in this because it feels like, 'oh, it's something big and far away from our daily thing.' But if you rather engage them in their field of expertise and then related to what their operations, it's easier I think to get them involved. However, that said, I think unfortunately, if you would go out and ask a lot of people living in VG, like people on the street, a lot of them won't know about this goal at all. So sometimes they- to some extent, it's a great initiative, but it hasn't really landed among the grassroots. Everybody at Länstyrelsen and everybody at the at the region, and all the politicians, and all the politicians in the different municipalities in VG, are probably all aware. But if you ask the person driving the bus, and somebody, a teacher, working in school, I would say that majority of them are not aware that we have a more progressive climate road map ahead of us in VG than the rest of Sweden has. But perhaps that could be seen as a failure and just in terms of communication and communicating to the normal citizens in the region.

Derek

Right. You were touching on, one of the first things that we talked about was, that one of the good things about it is that it creates this type of peer pressure, so to say, even though that kind of has negative connotations,

STENA AB

Yeah, positive in this way though.

Derek

Yeah, yeah exactly. But it does, it creates this similar playing field. That everybody is playing by the same rules. And so, from your perspective, you're saying that there that that knowledge is still very much restricted to pretty high-level actors then when it comes to carbon budgets?

STENA AB

Yeah. So that's my impression at least, and I think I have quite right in that.

Derek

How? This is my first interview with somebody from outside of the municipality or the region itself, and maybe that's kind of a confirmation about what you were just saying. And so,

STENA AB

I'm giving you other thoughts in your head now and other answers perhaps.

Derek

Yeah, exactly. I have to try to think about these questions a little bit differently I guess I'm realizing. But something that you're saying then is that it still seems very much like the idea of carbon budgets is located within government agencies, government organizations, as opposed to other areas of society, is that right?

STENA AB

Sorry, I was just going to write to you that you froze.

Derek

Oh, I'm sorry. I'll repeat myself.

STENA AB

Yeah. So please repeat that again.

Derek

So yeah, it seems like what you're saying and what you've kind of described. And again, I'd just like to reflect so that you can reflect back to me and make sure I'm understanding this, it seems like knowledge about carbon budgets is still very much located within government agencies, municipalities, the region politicians perhaps, and that maybe this information and this approach is not shared among other actors in society. Is that right?

STENA AB

Yes, that's my impression. And I think from a company perspective you are first of all, you're, like everybody is, you're occupied with the daily operations and then you have other engagement, industries initiatives. Like say for shipping, we're very involved in Swedish, Svensk Sjöfart, shipping associations, and our property industry are involved in other initiatives with other property owners. But in one way I would say that our property business area is more involved with the municipality due to their business than what our shipping is. Because some of our business areas within the shipping field, their vessels are never calling ports in Sweden. So, with them is more relevant to know what's going on- and I think a lot of the companies, if you are a global company- but that's not

just within the carbon budget. I think there's so many other questions where companies and the public sector, we don't really reach each other because we're so involved, so that's why it's good that we have some sort of ways where we can interconnect, and I think Klimatrådet is a good initiative 'cause that sort of brought our attention to that this carbon budget is around and Klimat 2030 to just sort of sit around the table and share expertise. One of the purposes is to sort of build this network of how we can help each other and perhaps if it's just in a discussion or just perhaps building on future partnerships together. But I think that's often a sort of a way that it's hard sometimes for the public and the private and to meet. Because sometimes we have, well, in one sense we talk different languages, and we were playing by different rules.

Derek

Can you elaborate on that?

STENA AB

Although climate, obviously, is something that involves or affects us all. So, it's a good cause to gather around.

Derek

Yeah. One of the things that my research is bringing up is that carbon budgets help us think differently about emissions. And the way that carbon budgets now are focused around this 'emissions space.' You know, there's only so many gigatons of emissions space left within the atmosphere. When you think about carbon emissions in that way, how does that change how you 'do' carbon emissions? Does that make sense? How does that change how you think about managing carbon emissions, I guess is what I'm trying to say?

STENA AB

Speaking from a company perspective, I think there are, when we think of carbon or emissions, first of all, is like I think, just looking at all the graphs that IPPC that are pulling out and we have to keep the average level on Earth below 1.5 degrees and as of now they're not going the right directions, the prediction areas of how the temperature is going to rise. I think that creates an urgency that we want to do what we can to contribute. And at the same time, you want to contribute and it's also a responsibility that we should do what's possible within our field of impact. And then at the same time it's also, can you build, from a company in perspective, can it build a competitive advantage of being the first of, either claiming a brave target, but then obviously you also have to live up to that and not just talk, because then it's just pure greenwashing. And then you have sort of you don't communicate, but you really put a lot of internal effort and work into trying to do your part, but you don't want to communicate, sort of play it safe. So, I think and then it's also, in one sense, for companies when it comes to this, feel that the other thing that comes in is legislation. If it's legislation that's coming in, how would that affect us? Are we supposed to just do business as usual before the legislation comes? So, there are different elements, I think, that when you think of emissions as a company, they're different sort of paths that you think of and specifically when it comes to legislation. Companies want fair conditions to compete. So, in that sense, when- I don't know how familiar are with shipping things- but there was something called the ?SECA? directive that kicked in in 2015, where there were regional areas where we could only use lower sulfur in the marine fuel. So, it was with the purpose to reduce the sulfur emissions, which is great, but it turns out that just by having these local regions it put the competition out of order. That was a good initiative and with the purpose of reducing emissions and contributing to a better climate, but it also put the competition between companies. What wasn't really put into- it was put out of its role. And that's something that companies don't like. You want to compete on fair terms. And so, when it comes to emissions this is just sort of an initiative, as of now, that companies have signed up to as is not a legislation yet. But I think if you've only talked to the municipality and the public sector previously, I don't think they have sort of this in mind in the same way a company has at the same time. That you want to compete on fair terms, they want

to have the same conditions. So, whenever you put in regional or national aspects in and you're operating in a global field, or even if you put in local things and you're operating on a national field, that sort of put a hinder into the competition. It was a long answer, perhaps not directly to your question, but that sort of at least tries to scoop it in the way we view it.

Derek

I think so. And it makes sense to me what these potential conflicts could be. It brings me back to what you had said earlier, and it seems like you're kind of touching on the same thing. That the carbon budget must apply to everyone equally, everybody needs to be on the same terms. But then, you've added now, that once you introduce legislation there is some kind of secondary effects that, anticipated or unanticipated, they cause uncertainty and changes within these kind of market dynamics. And that that itself is a challenge for companies to deal with and it becomes more complex. When you are acting at different levels and having different spots of negotiation going on.

STENA AB

And I just would like to add to what you what you said first, and quoting me, “it should be equal terms and it should be equal for everybody.” Theoretically, yes, but at the same time you need to take in consideration too what industry you are in. 'Cause there are certain industries that have come a long way in progress towards reducing-

Derek

I'll start recording again and but yeah, so the last thing that you were talking about when you were trying to explain here that there needs to be some recognition about the different progress that companies have made so, theoretically, there should be some kind of even playing field, but that there needs to be some type of-

STENA AB

Yeah, consideration to how far the technology development has come in certain industries. And there are lots of reasons for why certain industries haven't developed as much or aren't as far ahead when it comes to technology and climate-efficient or climate-smart technology to be used. And specifically for shipping, like the $10,000 question to break is, what is going to be the future fuel to use? Cars and trucks on the landside are looking into electricity, it’s not possible if you're sailing on the deep seas. And saying that so equal playing field, yes, that's what we want, but at the same time consideration that we are starting off from different places.

Derek

Yeah, and that maybe there is some type of structural barriers for transitioning going on as well?

STENA AB

And I think that the more global you are, you would have more structural hindrance, hinders and barriers because then it's not just about a nation. It's not just about EU. Then you need to sort of take into consideration where is everybody, the actors and the players on the global market in this field. And so, shipping is definitely, I would say, one of the most challenging areas when it comes to battling climate. Because it's global and we're quite progressive here, shipping owners in the North of Europe, but then you can compare that to shipping owners in, you know. I don't know. Outside Madagascar or whatever. That's very far away from your local carbon, but sorry.

Derek

But it's something that needs to be understood and considered when discussing carbon budgets, which

is your point.

STENA AB

So, going back to that, I think you can sort of buy in and get more engaged in the local carbon budget if you are- In this Klimatrådet now we have a local 'ICA Handlare' ??? which is an island in ?Bo??. She has her whole operation on that island in that ICA store, and I think perhaps have a bed and breakfast also, but they're very local, central, and everything here is about. So, I think it's easier for a company with that sort of operation to become more involved in a local carbon budget than if you are sort of spread out all over Sweden, all over Europe, or perhaps all over the world. So, it's important to work with a local carbon budget, but at the same time it also, being a global actor, it also emphasized the importance of having other national, regional, or intercontinental and global initiatives as well. Because you sort of play on all those different fields.

Derek

Uh, I can't help but think that this is, and I think you've mentioned this too, this is a lot less about carbon budgets than it is about kind of general governance issues between market actors and state actors.

STENA AB

Probably so. But perhaps that's also why we haven't really come across the local carbon budget until we were invited to take part? Because it's far away from our daily operations and perhaps that also brings in a dimension into your studies of how relevant are they? And now they're really reaching the right stakeholders? And who are the stakeholders in the local carbon budget? And how can you engage with them and to get them interested in getting their buy in, basically, to sort of support this local agenda? 'Cause sometimes, from our company perspective, I think there are a lot of great initiatives that seem great theoretically and on the paper. But when we actually apply them into a business context it's hard to make them fly.

Derek

And in the case of carbon budgets, and even if we strip out the local a little bit because they still work on a similar logic, it's a little bit different, but what would keep you, or Stena, from adopting a carbon budget approach or using carbon budgets as kind of strategic tool for decision making?

STENA AB

We have sort of kept tracking our carbon emissions and 12 years back. But I think we are still operating in the world where we're not really pricing externalities. As of today it's too cheap to emit. And now it's been decided within EU that shipping is going to be included in the EU's ETS and I think that's gonna perhaps bring about a change in how we view it. Because it's been sort of a bit separate. That there are so many questions that are a bit of a silo thing, that emissions are bad, bad for the climate, bad for company reputation and whatever, and bad for people, but it hasn't as of now really affected our P&L. Uh, but when you sort of-

Derek

P&L?

STENA AB

A profit or loss. Your balance. Your results, financial results. So, one way I think that would interlink these two is that you actually put a price on it. But then, once again, fair playing field and fair conditions to the industry where you're at. So, and I think it's going to become more important. We

have already sort of included it and reporting on our carbon emissions as part of our internal financial budgets. So, our management are aware of how much are they are to emit, but there has been no system as of now to actually price that. Otherwise, in terms of that we are emitting when we are burning fuel. So, if we have to buy less fuel, we will emit less, and it would save us money if we can drive more efficiently. So that's sort of been the only connection between the cost and the benefits, social benefits, if you would talk about emissions on a larger level and the internal company budget, financial budget, I would say.

Derek

The financial budget is kind of irreconcilable. It's-

STENA AB

Is what?

Derek

It's kind of 'the thing.' It's 'the decider' for just about everybody I guess for what gets done and how.

STENA AB

It is still it's yeah. Yeah, well, that's still the most companies operate. It's about being profitable. Otherwise, you're not here for the long run. But at the same time, I think it's also good because if you are profitable, you can put in money to set initiatives that would help reduce climate effects.

Derek

So, it feels like you're helping me to kind of build a better picture about this, multiple interactions, about carbon budgets and how they might or might not work. And it seems like a lot of it seems to come down to that if a carbon budget is going to work then it has to do something to help restructure the rules within the market while also accounting for the peculiar, the specific states where different industries find themselves.

STENA AB

Yeah, more or less so. And I think it needs to sort of be- well, most companies are still run by when you make your investment decisions and you have often an ROI. It needs to be paid back in X amount of years. But then you also need to, as of now, carbon emissions hasn't really been priced, at least not in the sectors where we are operating. It needs to be clear, that you see the benefits and actually putting that factor into the calculations that by helping reduce emissions, by doing this and this, we will get these in these benefits. Either financial or but at least we can sort of take them into consideration when you're basing your decisions, and in that sense, I think most carbon budgets local, formed by municipalities, they have been more on a theoretical level so that don't really go into the core of how a company operates. It's a nice thing, but it doesn't really sort of kick into- It's not speaking our language, so to say.

Derek

Right. Uh, if I can take a sidebar, it's not just the companies, it's the region and the municipalities, seem to be struggling with understanding how they should operationalize carbon budgets as well.

STENA AB

Yeah, I can imagine. Having is such a diverse operation as well as a municipality, so yeah.

Derek

So, it is something that I'm trying to understand as well within my research, then, is how just thinking about a problem differently, what does that really mean? You know, in this context.

STENA AB

But I think also one thing is that- was it last week? No, two weeks ago now that Biden invited all the global leaders. But having all the global leaders and the big nations of the world in the regions stating that 'we are gonna be carbon emission free or whatever in 2050 or 2045. We're gonna reduce our emissions.' But it has to be broken down to something tangible that actually people and companies and actors can understand and put into their contexts. So, it is a good thing, but it hasn't really drilled all the way down perhaps. But if we are to reach these targets that they, global leaders, have set up, it needs to be- we need to start moving now and this is one way or one tool that has been set up to make a step towards that we actually hit this target. But I also think in a way, this is my personal view, that 2050 is very far off. A lot of people are thinking that 'I'm not going to be around so why should I care?' Perhaps being a bit generalizing in thinking bad of people, but I think that's the way many people will think. But 2030, that's in nine years. So perhaps setting up targets that have a bit of a shorter timeframe makes it more real.

Derek

With carbon budgets, is there any thought about making a carbon budget for Stena AB that's kind of independent of the territorial based emissions carbon budgets? Like you could have one for the company? Is that something that's discussed?

STENA AB

Yes. It's been discussed, yeah, and we it's part of our financial budget as of now. But it's not been put more systematic than that. But we actually are keeping track and as part of the budget and I would say that part of the discussion is also we should have a for the whole group or if we should have a sort of more for the shipping side and then non-shipping as separate because it's apples and pears. Even though we're in the same group. Costs are different, how will we do that? Coming back to that, different industries have come differently far in these questions. There's one way trying to find a level playing field even within our group. We find it a bit difficult being such a diversified group in terms of what we are doing in operations.

Derek

You've said that that you've got some type of carbon budgeting going on in connection with the economic budget. What does that look like?

STENA AB

Well, it's part of the financial budget. That whenever that's presented up to the mother company, each business area does that, they are also to present their carbon budget. How much they are planning to emit for the next coming year in their operations and at least to have it up there. And then, there's some more discussion. Now some companies have set clear targets of how much they are to reduce their emissions in a certain timeframe, and for those companies that have not yet put that, it's more of a discussion: 'So, what are you doing to reduce these emissions and what actions are you taking?'

Derek

You're talking about the daughter companies that Stena AB- OK.

STENA AB

Yeah, so there is a discussion.

Derek

Within those discussions themselves, within these particular discussions, what is it like to talk about the carbon budget? And why connect it explicitly to a financial discussion? Why is that that's where the carbon budget discussions or emissions should be located?

STENA AB

'Cause it is an important process in the company. It's probably the most important, the financial. And it's also, going back to what I said previously, companies are run very much on financial results, otherwise we will not be here tomorrow if we don't produce results. So, connecting rather than- some companies have more of a sustainability or health, safety and quality department, but to really get them talking to their CFO and their business controllers. It's a way to sort of have not a silo effect of this topic, but actually making sure that it's mainstream now throughout the company. I think it's also at least in company wise it's important for us to have sort of an efficiency measure on our carbon emissions. And at the same time, we also are tracking the emissions in absolute numbers. But if you want to grow a business, they need to be set in relation to something. Otherwise, if you're growing your business and even if you are doing it in a more efficient way, your emissions will still grow. It's two measures that we need to keep in mind. That it's both tracking the absolute numbers but speaking of more relevant and material KPIs to measure the operations they need to put be put into relation. So, it's emissions in relation to, if it's square meters that you have in your portfolios if it's Stena Property or if it's nautical miles that we have sailed, or cargo that we have transported, so that we're not putting a limit to ourselves in terms of growth. Do you understand? So, there's also dual measurement thinking that we need to have in mind working with these questions internally and those relational KPIs need to be different for all our different business areas because they're so different in their operations.

Derek

Can you define KPI for me really quick?

STENA AB

Key performance indicators.

Derek

Thank you. I come from a political science background, so some of the kind of business jargon goes over my head. When you're thinking about this question then, as the business grows, as the market share grows, your share of emissions within a carbon budget is also growing then, the ones that you become responsible for reducing. Yeah?

STENA AB

Yeah, so that's why I say that it's important that we have both in mind. That we are in one hand also keeping track of the absolute figures, but also having them in relation to something.

Derek

So there needs to be some kind of comparison going on for a cost benefit analysis?

STENA AB

Yeah, you could say that. And I know that DI, Dagens Industri, the business paper in Sweden, they

say that it's perhaps not the best KPI to measure, but they sort of brought about a climate indicator for their listed companies in the Stockholm Stock Exchange. That they have taken out emissions from scope one and scope two from the companies that have published that and then they divide that by their turnover. So, they are themselves saying that there could be better measures to measure some sort of climate index, but this is the best way that we could find out now. It's such an important question that we cannot just sit on our hands thinking of 'what could be the perfect KPI to measure all the dimensions of this?' but we'll start up with this. Some are using turnover, or other things. What's relevant for their business?

Derek

That's interesting. The Stena Group also have one of those indicators that you're working with? Is it that specific indicator? You said scope one and two emissions?

STENA AB

Yes, it's different how far different companies have come. Being a transport company obviously we have most of our emissions in scope one. But Stena Property have done a big survey last year and the year before to sort of investigate all of their emissions in scope 1, 2 and the most material ones in scope 3 and set a target that they are to reduce 50% to 2030 from 2018-year levels. But it's hard to put a group target since we are so different in the way that the businesses that we are running. So that's why it's sort of been pushed down to the different business areas to decide their targets, but we're following it and we're having discussions from a mother and the AB board, the Stena AB board, perspective with the separate business areas to sort of have a spotlight on this question because it's obviously the most material one that we have.