

## **“Waste Not, Want Not”:**

An analysis of sustainable waste management practices in Fort Collins, Colorado from a transition perspective

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## **Abstract**

Increasing waste generation levels are presenting a multitude of issues from both low and high-income countries around the world. High levels of greenhouse gas emissions, water contamination and ecosystem endangerment are all concerns that are exacerbated by improper management of waste. Major shifts in the waste management sector are necessary in order to tackle these issues sustainably and for the long-term. Some cities in the United States, the second highest waste generating country in the world, have taken steps to address these issues on the municipal level. Fort Collins, Colorado is one such city that has made varied attempts to increase waste diversion and reduce waste generation in the community. However, the structure of the governance of the current system is limiting the progress the city is able to make in their transition to a sustainable waste management system. This thesis uses a transition perspective to analyze and assess the current state of the governance of the waste management system in the city of Fort Collins. The multilevel approach to transition management with a focus on the socio-institutional settings is applied to Fort Collins to show the ways in which the city does and does not adhere to a systematic thinking in governance of waste. The thesis then advocates for the adoption of transition management by the city to further aid in the pursuit of a sustainable waste management system.

**Keywords:** Waste management, transition perspective, governance challenges, sustainable waste management, multilevel approach, transition management

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*“Raise your words, not voice. It is rain that grows flowers, not thunder.”*

- Rumi

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## 1 Introduction

Waste management (WM) is a major issue that nations all around the world are dealing with in the 21<sup>st</sup> century. Both low and high-income countries face the challenges of the massive scale of waste being generated, particularly from high-income countries (Kaza, Yao, Bhada-Tata, & Van Woerden, 2018). From a 2016 estimate of 2.01 billion tons of waste, the World Bank has predicted that waste generation could grow to 3.40 billion tons by 2050 if a business-as-usual scenario is maintained (Kaza et al., 2018). The way that countries manage this waste varies, as some countries have more money and infrastructure to collect and dispose of it. However, even the countries that have systems set up to manage waste, these systems have major flaws that are creating problems for the health of humans and the rest of the world. Making up only 4% of the population, the United States is second in the world for greenhouse gas emissions, and 65.4% of trash generated is either sent to a landfill or incinerator (Bradford, Broude, & Truelove, 2018). The waste generation and disposal process in the US accounts for 42% of all US greenhouse gas emissions<sup>1</sup> (Bradford et al., 2018). On top of this, there are major concerns with water pollution from unlined or leaking landfills, habitat destruction from improper or illegal disposal, and wasted natural resources, among many others (Bradford et al., 2018). With these figures, it is obvious that there are fatal flaws in the current WM system in the US that need to be addressed to prevent further harm.

Due to lack of detailed federal regulation for waste in the United States, much of the responsibility for dealing with the challenge of waste management fall on municipalities and local governments<sup>2</sup>. There is also responsibility on municipalities for waste management to create more sustainable waste management systems because they are the governing entity that is closely managing the system (Gustafsson & Ivner, 2017). While some cities have stayed under

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<sup>1</sup> This figure includes extracting resources, producing goods, disposing of waste, and transporting materials at every stage of that process (Bradford et al., 2018).

<sup>2</sup> The US does have regulations for waste management under the Resource Conservation and Recovery Act (RCRA) Laws and Regulations, however a large amount of implementation and policies are produced by municipalities and local governments (EPA, 2019).



the “business-as-usual” method of collection and disposal, others have made attempts to correct and improve their local systems to be more efficient and sustainable. This thesis specifically focuses on these types of efforts made in the city of Fort Collins, Colorado. Over the past couple of decades, the city has promoted and enforced recycling and has made efforts to reduce, reuse, and divert waste from the major landfill in the region. The city is in the midst of a transition into a sustainable WM system, but there have been challenges encountered along the way, many of which have been linked to policy implementation and governance issues. Through the utilization of transitions perspectives, this thesis will assess how the governance transition steps of the City of Fort Collins fall in line with the multilevel approach to transition management and where gaps are in this process. This aims to understand how the city could benefit from fully adopting the multilevel approach to governance of the WM system. The transition perspective will also be utilized to assess the governance challenges that Fort Collins has faced thus far and will assert how governance through transition management can help to create long-term societal change for the WM system in the city.

The research questions guiding this inquiry are:

**RQ1:** What is the current structure of governance of the waste management system in Fort Collins?

**RQ2:** What are challenges and opportunities for Fort Collins in steering current practice towards sustainable waste management?

**RQ3:** How can the transition perspective be applied to waste management governance in Fort Collins to support systemic management of change?

The thesis will start with a background that further explains the current waste management system in Fort Collins and the perspective of sustainability and sustainable development for the case. It will then detail the theory and frameworks used to ground the research and the methods of data collection. Following will be a results and discussion section, which includes application of the multilevel approach to transition management and governance challenges of transition

management to the WM system in Fort Collins. Following will be a discussion about the adoption of the multilevel approach by the city for the governance of the transition of the WM system and how the city could benefit from it. The thesis will end with concluding remarks on the case and research done.

## **2 Background**

### **2.1 Waste Management in the United States**

The US Environmental Protection Agency (EPA) regulates waste management through the Resource Conservation and Recovery Act (RCRA), which set standards for both municipal solid waste and hazardous waste disposal (EPA, 2019). While hazardous waste disposal is extremely important, this thesis focuses on how the city of Fort Collins manages its municipal and commercial solid waste, rather than hazardous wastes. Title 40 of the Code of Federal Regulations (CFR) manages this regulatory framework and delegates the minimum functioning requirements of waste disposal and recovery facilities (EPA, 2019). However, each state and even each city within the US has its own WM system that is at least partially controlled by the municipality. The EPA “. . . encourages communities to consider the waste WM hierarchy . . .” (see appendix 1 for diagram) for their own WM systems (EPA, 2017). The hierarchy cites disposal and landfilling as one of the “least preferred” methods of WM, with reduction of waste generation at the top tier. Ironically enough, the most common disposal method in the US is by landfilling, of which each site is monitored and designed based on regulations from the RCRA (EPA, 2019). As of 2015, landfilling accommodated for 52.5% of the waste produced and managed in the US, recycling at 25.8%, composting at 8.9%, and 12.8% devoted to incineration with energy recovery (EPA, 2018). Unfortunately, this suggested perspective of waste management shown in the waste management hierarchy is not often used in municipal governance of the system in many cities.

While the hierarchy may be what is “promoted” by the EPA, the typical structure of municipal solid waste management consists of curbside trash pickup that is delivered to landfill areas, with

some cities providing recycling to citizens as well. According to the World Bank, 54.3% of waste in North America is landfilled, 33.3% is recycled, 12% is incinerated, and less than 1% is composted (Kaza et al., 2018). Because US regulations require waste to be picked up and managed by municipalities and private entities, the perception of the waste problem is that there isn't one. The trash is taken to a facility far from the average citizen's eyes, to be buried or burned, left for the next generation to deal with in one way or another. The problem with the waste management system in the US is two-fold; the end-of-life management is not reusing and recycling as it should be, and the rate of consumption in this high-income country is producing unmanageable amounts of waste. The current waste management systems in many of the municipalities across the United States are unable to deal with these issues in a sustainable manner.

## **2.2 Impacts of Current System**

The United States is one of the highest waste-generating countries in the world. The *What a Waste 2.0* (Kaza et al., 2018) report on world waste issues states:

*“Though home to less than 5 percent of the global population in 2016, North America generated 14 percent of the world’s waste, at 289 million tonnes with a daily rate of 2. 21 kilograms [4.87 lbs] per capita [. . .] The high waste generation rate reflects the high-income status of these countries and related economic activity” (Kaza et al., 2018)*

Regardless of if the US has a system that can collect and dispose of waste in another location, the sheer amount of waste being generated by the country has and will continue to have a major impact on environmental and human health. Fort Collins is not exempt from this system. People living in the predominately white, middle class city have the ability to consume materials and a relatively high rate, which in turn means a high rate of waste is being generated. According to data collected by the city from 2017, 4.92 pounds of material per capita is sent to the Larimer County landfill every day (Mitchell, 2017). The average for North America (Canada, the United States and Bermuda) was calculated at 4.87 pounds of material per capita per day (Kaza et al.,

2018). In low-income regions, waste generation rates are between 1-2 pounds per capita per day (Kaza et al., 2018). This gives perspective as to how much Fort Collins is contributing to the waste generation and management issues in the US and the world.

On a global level, one of the largest concerns regarding the current system of disposal of these massive amounts of waste is methane emissions from landfill sites. The decomposition of massive quantities of organic materials produces this greenhouse gas that contributes to global climate change. According to the EPA (2019a), municipal solid waste is the third largest contributor to GHG emissions in the country, meaning that it is a large contributor to climate change. Another impact the WM system has is groundwater contamination from leaking or unlined landfills. Many landfills in Colorado are older and unlined, or their liners have broken down, which leaves the opportunity for a liquid called leachate to seep into the soil and surrounding groundwater resources (Brown, 2018; Danthurebandara, Passel, Nelen, Tielemans, & Van Acker, 2013). Leachate contains heavy metals and high levels of nutrients from decomposing organic matter that can adversely impact local ecosystems (Danthurebandara et al., 2013). There is also large controversy over how plastic waste is managed in the US, which has larger ties to the global recycling market that involves the exportation of low-value plastics to many Asian countries. These low-value, single use plastics often end up dumped illegally, and have begun accumulating in ecosystems such as the ocean and are doing irreparable harm (Danthurebandara et al., 2013). The impacts of improper and misdirected WM on local and municipal levels can create harm not only at the local level, but on the global level as well.

### **2.3 Waste Management in Fort Collins, Colorado**

Waste management in Fort Collins, Colorado is managed in the typical methods described above, with a landfill owned by Larimer County in the south west area of town being the primary location for disposal. The municipality sets regulations for these landfill sites, as well as other ordinances pertaining to waste collection, recycling, and hazardous waste management. There are several private trash haulers that collect waste and recycling in curbside containers and haul to the

Larimer County landfill site. The containers for pick up are regulated by the Pay-As-You-Throw (PAYT) ordinance that was established in 1996, in which waste billing is based on the size of the trash receptacle. The ordinance also mandates unlimited single-stream recycling at no additional charge; however, the private haulers may include surcharges to accommodate for fluctuating market prices on recyclables and fuel costs. PAYT was established to promote waste reduction through the economic incentive of saving money and to promote recycling by offering it at no cost (Anthony & Liss, 2013).

The city has created several proposals and plans for improving the sustainability and long-term goals of the waste management system. The Road to Zero Waste (RTZW) proposal was published in 2013 which focuses on waste diversion, waste reduction, and resource recovery, each of which being tenants of the concept of zero waste (Song, Li, & Zeng, 2015). The plan highlights the economic, ecological and social benefits of waste diversion, along with goals and objectives, recommendations, and a “road map” for the implementation of the plan (Anthony & Liss, 2013). The priorities for change within the implementation section of the proposal include culture change, reduce and reuse, compostable organics out of landfills and construction, deconstruction and demolition. Fort Collins City Council adopted the goals listed in the proposal, which include a 75% diversion rate by 2020, 90% diversion by 2025, 2.8 pounds of waste generation per capita, per day by 2025 and “zero waste” or 100% diversion by 2030 (Anthony & Liss, 2013).

The city’s Climate Action Plan also includes these waste management goals set in the Road to Zero Waste proposal and how it contributes to reducing greenhouse gas (GHG) emissions and curbing climate change (*Fort Collins 2015 Climate Action Plan: Framework*, 2015). There also is a recently adopted Regional Wasteshed Coalition that addresses the impending closure of the main landfill in the region in 2024. The plan outlines the development of “. . .resource recovery facilities for green waste and construction debris, a convenient trash drop-off site for residents and trash haulers, upgrades to the existing recycling center, and a new landfill in the north part of the county”, all of which has been planned through several years of analysis and stakeholder engagement (FCgov, 2019).

However, the main structure of the waste management system in Fort Collins still adheres to what is considered “typical” in the United States, as explained above. This entails that Fort Collins is also contributing to the impacts of the current system overall. There are still large amounts of methane and GHG emissions that come from waste management in Fort Collins, leachate and water contamination issues, and plastic waste issues that the city contributes to in whole (Anthony & Liss, 2013; FCgov, 2019a; Mitchell, 2017).

It is important to recognize why the city of Fort Collins was chosen for this particular report. As mentioned previously, high- and low-income countries both face challenges as it pertains to waste management and waste generation. Low-income countries tend to not consume and produce as much waste as high-income countries, but they lack infrastructure to deal with what is generated and often times import waste from high-income countries in an effort to profit from it (Kaza et al., 2018). High-income countries, especially the United States, may have the infrastructure to collect and sort waste, but generation rates are astronomical, leading to the high-income countries resorting to shipping the waste overseas to be rid of it (Kaza et al., 2018). Fort Collins presents a unique case in that there has been recognition that the system is not functioning properly and that something should be done about it. The Road to Zero Waste proposal, Regional Wasteshed Coalition and adoption of zero waste goals show a desire to plan and improve for the future. However, governance of these objectives and recommendations from these documents has been lacking and need improvement in order to achieve a more sustainable WM system. This thesis argues that the city is in the midst of a transition and would highly benefit from embracing sustainable transitions management in order to renovate the societal system of WM in the city. Using a theoretically based and scientifically researched framework could increase the city’s chances of success and may also be used as an example for other municipalities in the US looking to transform the way they view waste. Fort Collins could be used as an example of the application of transition management and governance from a transition perspective for other cities in the US to look to in their own paths towards transitioning to sustainable WM systems.

## 3 Theory and Frameworks

### 3.1 Sustainability and waste management

Having an understanding of what sustainability entails when discussing a transition into a more “sustainable” system is paramount. Sustainability has become a term with many meanings used in a multitude of disciplines. For this thesis, the term sustainability aligns with the definition of sustainable development and the United Nations Sustainable Development Goals (SDGs). Waste management is an integral element of city planning and development and is a societal system that effects all lives. The UN SDG website defines sustainable development as “. . . development that meets the needs of the present without compromising the ability of future generations to meet their own needs. . .” and should include “. . . economic growth, social inclusion and environmental protection” (“The Sustainable Development Agenda,” 2019). Within waste management, there is a firm emphasis on municipalities to deal with WM issues and infrastructure, as they are the entities that control the management of the system (Gustafsson & Ivner, 2017). Achieving the SDGs related to WM will mean that municipalities must make changes to the governance of the current system to align with the goals. The context for “sustainability” in sustainable WM is also set by the emphasis of systems thinking and a transdisciplinary approach to the WM system. Systems thinking requires sustainable WM to focus on approaches that are holistic and context and practitioner dependent, and that emphasize networks, process and reflexivity (Seadon, 2010).

The specific SDG goals that are related to waste management in this context include:

*Goal 11.6:* By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

*Goal 12.5:* By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

*Goal 12.8:* By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

While there are only three goals listed for this thesis, WM is a system that is directly linked to 12 of the 17 SDGs (Gustafsson & Ivner, 2017). Some of these 12 goals are more relevant in the context of developing or low-income countries that would face different governance and infrastructural challenges than municipalities in high-income countries. These goals should be drivers behind the change in current governance methods for Fort Collins in their quest for a sustainable WM system. These goals also help to answer RQ2 because they define what a sustainable WM system should strive for and how a change in the governance of the system can contribute to sustainable development.

### **3.2 Transition Perspectives and Sustainability Studies**

Transitions are typically seen as large-scale, nonlinear shifts from “. . . one dynamic equilibrium to another” (Loorbach, Frantzeskaki, & Avelino, 2017). Used in many disciplines, increasing interest has been shown in sustainability transitions in order to solve “wicked” problems and to address societal challenges. In the 1990s, there was an intersection of research in the fields of innovation and technology studies, and environmental studies and sustainability sciences (Loorbach et al., 2017). This collaboration created a complex, interdisciplinary research field that aims at addressing real world sustainability problems in both socio-political and technological dimensions. The real world application meant that the field focused on governance and policy implementation, with an emphasis on reflexivity and nonlinear governance frameworks (Loorbach et al., 2017). The field eventually shifted from a focus on socio-technical systems into one that included ecological, economic and political aspects just as much as the technical aspects.

Many international institutions have applied transition perspectives to their own operations as policy concepts that can help to tackle systemic challenges and create long-term change. These



include the European Environmental Agency, the Organization for Economic Cooperation and Development (OECD), and the Climate-KIC partnerships, to name a few (Loorbach et al., 2017).

Central to the idea of transitions is that there is disruptive, nonlinear change that occurs in the dominant configuration of a specific societal system, which is also known as the regime.

This transition can be further understood by the multilevel perspective (MLP)<sup>3</sup>, explained by Loorbach et al. (2017):

*“The novelty introduced by this transition perspective was that it understands a dominant configuration or regime in the context of its interaction with changing external (landscape) factors, preferences, and pressures as well as in interaction with emerging novelties, innovations, and alternatives [niches]. Societal regimes (e.g., dominant technologies, institutions, routines, cultures) emerge out of historical transitions and develop path-dependently through processes of optimization and incremental innovation. As the broader societal context changes and new radical alternatives develop and emerge, regimes inevitably will enter a process of increased stress, internal crises, destabilization, and shock-wise systemic reconfiguration” (Loorbach et al., 2017)*

There is also an important element of coevolution in transitions that explains how this complex system change works. In practice, transitions deal with technological, social, economic, ecological and institutional factors and how these different factors are interacting with each other over time. This overlapping and interplay of various domains stems from and fits well into sustainability science research, which looks at interdisciplinarity and reflexivity (Loorbach et al., 2017).

There are three distinct perspectives in sustainability transitions that focus on various aspects of transitions. These are known as socio-technical, social-institutional, and socio-ecological. For the purposes of this thesis, the socio-institutional perspective is used to look at policy and

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<sup>3</sup> The multilevel perspective (MLP) should not be confused with the multilevel approach to transition management in this thesis. In order to avoid confusion, the multilevel approach will also be referred to as the transition management cycle based on (Loorbach, 2010).

governance structures. Socio-institutional perspectives look at the problem through the lenses of culture, structure and practices with transition management in mind. From this viewpoint, routines, powers, interests, discourses, and regulations are able to create path dependencies which can be challenged by social innovations that disrupt dominant, locked-in regimes. Research in this area is devoted to looking at governance systems, and tends to be more qualitative, action-oriented, and transdisciplinary (Loorbach et al., 2017).

This thesis emphasizes the perspective of reflexive governance as well, which looks for a change in the way environmental policy and planning is analyzed and designed and calls for more self-critical reflection of a specific systems method of governance. On this mode of governance, cognitive procedures are meant to encourage feedback at multiple levels of regulation so that actors' beliefs and norms can change (Feindt & Weiland, 2018). This thesis looks at transition management within this reflexive governance perspective and specifically uses the multilevel approach to transition management to draw links between transition management and the current governance structure of the city of Fort Collins' waste management system.

Sustainable transition management is a “. . .governance approach that organizes participatory exercises of envisioning, negotiating, experimenting and learning in order to deliberately accelerate and orient transitions for sustainability” (Frantzeskaki, Loorbach, & Meadowcroft, 2012). The concept is utilized with the goal of sustainable development in mind, meaning that the goal is to promote “. . .economic welfare, social equality, and ecological quality across society, and over generations in the future”(Frantzeskaki et al., 2012). Transitions create fundamental societal change that often take at least a generation to come to fruition, and creates interplays between varying scalar levels, which include the niche, regime, and landscape (Loorbach, 2007).

### **3.3 Social Practice Theory**

Within the perspective of socio-institutional transitions, there is more focus on social innovation rather than technical (Hölsgens, Lübke, & Hasselkuß, 2018; Welch & Yates, 2018). In this report,

social practice theory reinforces the focus on social innovations because it explains how societies are formed by practices that are created through individual action and how structures of societies influence practices as well.

Social practice theory asserts that rather than isolating actors as individualism does or making them inert entities that are at the whim of larger social forces as structuralism, the social sphere is “. . . a continuously changing composition of interconnected human activities, and of what these activities embody” (Corsini, Laurenti, Meinherz, Appio, & Mora, 2019). Social practice theory sees individuals as carriers of a practice and embedded in the prevailing organization of those practices. The theory is well described by the following quote:

*“Theories of social practice consider ecologically damaging forms of consumption not as a problem of individual consumer behaviour, but rather understand it as embedded within the prevailing organisation of practices. In turn, these forms of consumption are related to the collective development of what people take to be ‘normal’ ways of life” (Shove 2003).*

The theory maintains that shared experiences in a community show what is contextually possible in a scenario for individuals, and this creates a shared contextual reality that is the driver of individual actions that make up practices in a society. Practices can also be seen as built with tacit and implicit practical and discursive knowledge and that routine practices hold together the web of rules and resources that make up the social structure, which is a train of thought that was created by Giddens. This means that structure is manifested through the everyday nature of practices, and in turn, the structure is influenced by the practices (Corsini et al., 2019).

I utilize social practice theory in this report to support the claim that sustainable transition management, through the multilevel approach to governance, can and should focus on social innovations. Practice theory shows that everyday social practices can influence structure just as much as material and technological change can. With the support of policy implementation for social innovations and shared sustainable practices, structural regime change is possible. This perspective will also be used to understand how the current practices in the city of Fort Collins

regarding waste continually perpetuate the dominant regime of management, that inhibit the progression of transition to a sustainable system.

### 3.4 Multilevel governance for sustainable transitions

The multilevel approach that aids in governance for sustainable transitions includes the strategic level, the tactical level, and the operational level. The subsequent actions of the waste management system in Fort Collins that have led to the present state will be evaluated using this framework in order to show how the system has or has not been governed with a transition perspective. This will give an understanding of where the city could improve in their progress towards transitioning to a more sustainable waste management system. The following explains each level of the governance approach to prepare for the following analysis.

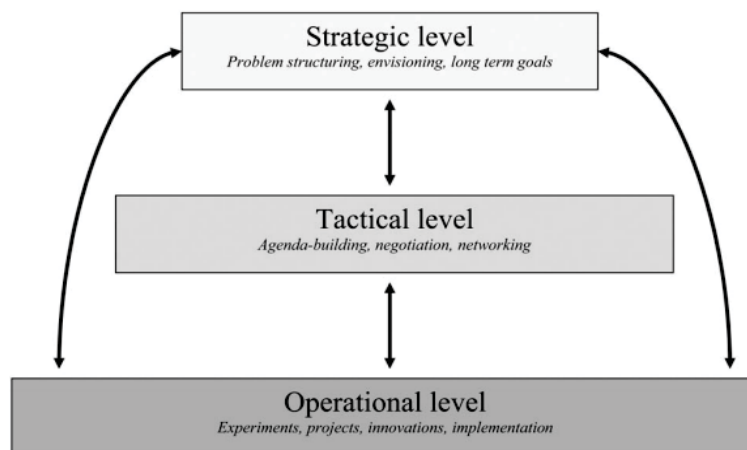


Figure 1. Multilevel approach to transition management. Source: Kemp et. al. 2007

*Strategic Level:* The strategic level consists of vision development, strategic discussions, long-term goal formulation, and collective goal and norm setting. This is the level that deals with cultural change regarding a certain system, which includes deliberation over norms and values, identity, ethics and sustainability. With transition management, long-term change is the focus, which is often contrary to typical policy-making due to variance of political cycles, public pressure, and individual interests. The aim is to ingrain long-term planning into policy making that prioritizes sustainable development (Loorbach and Van Raak, 2006).

*Tactical Level:* The tactical level is the network of regulations, organizations, infrastructure, and practices that are contextualized in the structure of the dominant regime of a societal system. These are referred to as sub-systems and vary based on what societal system is in question. The typical timeline that of 5-15 years, which does not align with the long-term planning that is so integral to transition management (Loorbach and Van Raak, 2006). This level often includes agenda building, negotiating, and changes in market structures to support the long-term goals of the transition in the societal system (Kemp et. al., 2007).

*Operational Level:* The operational level is defined by short-term time scales, that deals with “on the ground” projects that encompass societal, technological, institutional and behavioral practices that support that structures, cultures and actors of the societal system (Loorbach and Van Raak, 2006). This is the level at which innovations are born, experimental ideas that can come from individual ambition, business necessity or start-ups. This level is linked to the niche level in the multi-level perspectives model for sustainable transitions and is often linked to technological innovation. This paper will focus on social innovations in the societal system, which are arguably just as important as technological ones.

*Reflexivity:* An integral element in the transition management cycle is the reflexivity of the whole system. The process is not meant to be linear steps to take but rather a process that repeats itself and interacts between levels (Kemp, Loorbach, & Rotmans, 2007; Loorbach et al., 2017). Reflexive governance entails “. . .knowledge integration, anticipation of long-term systemic effects, adaptivity of strategies and institutions, iterative participatory goal formulation and interactive strategy development. . .” (Kemp & Loorbach, 2006). These elements should be upheld in the utilization of the levels of the governance process.

### **3.5 Governance challenges**

In implementing an effective cycle of transition management, several governance challenges are highlighted by Kemp et al. (2007). These include:

*Dissent:* People can have widely varying views of complex societal problems and what solutions to apply to them. There is also a large amount of uncertainty and disagreement on the long-term systemic impacts of these problems. This is what is referred to as dissent within TM literature (Kemp et. al. 2007).

*Distributed control:* Control is often spread to many stakeholders and actors in a system that all hold varying beliefs and investments in the problem. This can make unitary action close to impossible to reach, which is necessary to create societal change. There must be “. . . partisan mutual adjustment against long-term transition goals. . .” in order for the change to be functional (Kemp et. al., 2007). Creating collaborative network management between different layers of government is imperative for achieving transition goals (Kemp et. al. 2007).

*Determination of short-term steps:* Visualizing how short-term steps can influence long-term structural change in a societal system is a major hurdle for policy-makers to overcome. Kemp et. al. (2007) advises using forward and backward thinking, meaning the utilization of trend analysis and forecasting, paired with strategic experiments and systems analysis to develop a large variety of options and pathways for the transition.

*Danger of lock-in:* Lock-in refers to getting “stuck” in a specific frame of solutions that is no longer viable or useful in a long-term scenario (Kemp et. al. 2007). The risk is that a system may become too reliant on a specific option, and therefore be difficult to change in the future if need be. Creating a wide range of options for solutions, while using consistent review and flexibility of the system is also important in avoiding lock-in.

*Political myopia:* Recognizing that transitions take at least one generation to come to fruition is a major challenge in itself. Compounding on that is the recognition that political structures will

most likely change within the transition period. Policy-makers must keep this in mind in the utilization of transition management, and really in any circumstance of governance. Establishing a *transition arena* can be a strategy for addressing changes that have a higher sense of urgency, as many problems do today. The transition arena contextualizes the problem with a focus on long-term change that is outside of the “regular political short-term cycles” (Kemp et. al. 2007).

These challenges provide categories to apply to the current system in Fort Collins to highlight gaps in governance as well as areas the city has been successful and where it needs to improve.

### **3.6 Limitations and gaps of transition management**

While sustainable transition management presents many advantages to long-term transition governance, there are limitations and faults in its applications to societal systems. One caution made by Elizabeth Shove and Walker (2007) is about the politics of managing a transition arena. The authors question who determines who are the “managers” of the transition and who defines the “it” that is being governed. Shove and Walker call this process abstraction of the transition process, which can lead to issues of agency and political power. Lack of agency has also been identified as an issue by Frank Geels, a prominent researcher in sustainable transitions management (Geels, 2011). The framework tends to have a lack of awareness of the role that power and politics can play in a transitional setting. However, Geels also defends the framework, citing various theoretical applications to TM to provide insights on how to include positioning of cultural and social dimensions into the framework.

In the case of Fort Collins and the proposition of sustainable transition management in conjunction with social practice theory, agency is accounted for in the social innovations that would be contributed to the system. These innovations should come from a variety of actors, and as long as the space for conversation and collaboration with those actors is created, the city should be able to account for this limitation.

Another criticism that Geels (2011) responds to is that of the landscape becoming a “residual category” in the management process. This means that the socio-technical landscape is not dynamic enough, that it is simply a category to place a contextual influence and pay no mind to it. This critique can be made within the context of this thesis as well. Attention was paid to the regime and niche levels when discussing the multi-level perspective of sustainable transitions management and there was no mention of the landscape level in this analysis. However, this thesis focused within the scope of the city of Fort Collins in the state of Colorado, rather than on looking at larger transitions of the waste system on the national or international scale. While these broader contextual influences have an impact on the lower level regime and niches areas, the scope of this thesis limits the ability to discuss landscape influences on these levels.

## 4 Methods and Data Collection

### 4.1 Data Collection

The data collected to support the claims made in this report include both qualitative and quantitative methods.

*Interviews:* To better understand the complexities of the state of changes in WM practices, I conducted four informal interviews, three of which were with city employees (referred to as CE1, CE2, and CE3) directly connected to the RTZW plan and the waste management structure in the

	Title	Relation to FC	Sampling Method
CE1	Environmental Program Manager, Waste Reduction & Recycling	Employed by city since 1989	Purposive
CE2	Environmental Planner, Waste Reduction & Recycling	Employed by city since 2015	Purposive
CE3	Senior Environmental Planner, Waste Reduction & Recycling	Employed by the city since 2011	Purposive
CM1	Former mayor and city councilman; concerned citizen	Involved in several major recycling initiatives in the city	Snowball (referred by CE1)

Figure 2. Interview Information Table. Source: Sarah Hite/Interviews



city of Fort Collins. The fourth interview was with a citizen of Fort Collins (referred to as CM1) that has been involved in the waste reduction and recycling efforts for over 25 years, was mayor and previously on City Council, and who was involved in the Working Group created for the RTZW plan (See figure 2 for interview table). I structured the interviews to be informal and open to allow for individual concerns and ideas to come up naturally, allowing for a better understanding of what should be focused on in this case in particular. Interviews were chosen to have a qualitative and deeper understanding of the waste management in Fort Collins, as well as understanding different perspectives of the progress of the system towards sustainability. This is necessary in addressing RQ1 and RQ2, as they provide more insight into the day to day challenges and practices from the view of individuals working with the WM system in the city. I chose to meet with city employees specifically because they are major actors in how the system is governed, which is what is being questioned in this thesis.

*Document Review:* I evaluated documents from the Community Conversations conducted in 2013 for the plan in an effort to encompass thoughts and opinions from the public and from private business sectors (see appendix 2 for coding table). I have also reviewed documentation of diversion rates from 2013-2017 to understand the metrics of changes in waste diversion since the RTZW plan was published and the goals were adopted. Plans and proposals for sustainable development in the city that were used as well include the City Plan adoption draft that was accepted in April 2019, the Road to Zero Waste plan from 2013, and the Regional Wasteshed Coalition Master Plan that was accepted in April 2019. Policy and ordinance documents were analyzed to demonstrate common practices and rules that the city currently adheres to and to understand the current the waste management system. Understanding the up-to-date documents that plays a role in the control of the WM system in Fort Collins can show gaps and opportunities for improvement in policy set up by the city. Analysis of transition management literature covers the understanding and propositioning of sustainable transition management for use in Fort Collins for the waste management system. Having scholarly literature to support this proposition gives more credibility to the argument.

## **4.2 Case Study**

This thesis uses Fort Collins, Colorado as a case study in order to demonstrate the contextual complexity of applying sustainable transition management to specific cases. Case studies help to understand a broader system through a more focused scope, which can then be used to make generalizations about the use of different framework and theoretical foundations in real-world scenarios. Using this case study for proposing the use of sustainable transition management within waste management in the United States can create a conversation around making major shifts in this societal system, and therefore make more concrete justification for using theoretically based frameworks for change in these societal systems. Transition perspective and transition management can provide flexible and open means of governing transitions, so the framework and structure can be applied to different cases. Fort Collins has already started their transition to a more sustainable system, but it has not been as cohesive and productive as it could be. Understanding how its progress thus far fits into transition management and how full adoption of TM for the governance of the waste management system in the city can exemplify the importance of having a theoretically-based framework that guides societal change in a positive and successful way. Using as case study of Fort Collins helps to answer RQ3 and to support of these frameworks for systemic change.

## **4.3 Disclaimers**

Regarding my relationship to the city of Fort Collins, I wanted to make it clear that I have been and am currently an intern in the Waste Reduction and Recycling team, which began in mid-March of 2019. To the best of my ability, I have kept an academic positioning in my research, while also utilizing connections I have made during my time working with the municipality. My analysis aims to be firmly grounded in theoretical framing of the waste management system of Fort Collins and to provide constructive criticism of the current dominant regime of the societal system.

This analysis is not a reflection of the individuals working in the municipality but rather on the system within Fort Collins and how it relates to larger global issues of waste management and sustainable development.

## **5 Results and Analysis**

For this thesis, I made the decision to join the results and discussion sections in order to provide a more solid connection between my results and analysis of those results. I will first discuss the current dominant regime of waste management in Fort Collins. I will then explain, through the transition perspective, the current governance practices and steps towards sustainable waste management that the city has already taken using the three stages of the multilevel approach to transition management. This application will reveal ways in which the city governance conforms to TM and areas in which they can improve. I will then discuss how Fort Collins could embrace the sustainable transition management method for waste management and why this would be an improvement to the societal system.

### **5.1 Institutional settings of waste management system**

The sustainability of the city of Fort Collins functions under the three-pillar understanding of sustainability. This is to say that economic, ecological, and social sustainability have been adopted by the city as the framework for sustainable management of a city (FCgov, 2018a). Under this understanding of sustainability, the Waste Reduction and Recycling team within the Environmental Sustainability department is responsible for proposals for adjustments to the governance structure of the waste management system.

The current waste management system in Fort Collins is characterized by curbside waste and recycling pickup that is sent to landfills or is recycled and reused for new materials (Brown, 2018). In the United States and Fort Collins, recyclable materials are sent to processing facilities to be repurposed. As previously mentioned, the city is not exempt from the high waste generation

rates that the US is known for. Consumption is a major aspect of the system of WM in Fort Collins and peoples' consumption practices and habits are a large issue that plays into the collection and disposal of waste in the area (Anthony & Liss, 2013).

This leads into the view of waste in communities like Fort Collins, where consumption is high, and infrastructure is built to deal with waste generation. While having curbside pickup and large collection and disposal sites keeps streets and households clear of waste, it also perpetuates a practice of "set it and forget it" which can be detrimental for creating a sustainable waste management system. As citizens are able to put their waste in bins out on the curb to be cleared by the end of the day, it instills the idea that the waste is being managed, and that it is not something for the citizen to be concerned with. As curbside pickup is quite common in the US, this is a culture of assuming waste is being dealt with properly that could impede the sustainable transition for many cities (Kaza et al., 2018).

The municipality has made it clear that they are aware of not only the disposal issues that coincide with landfilling, but also the consumption issues from which the high waste generation levels stem from. In my interview with CE2 we discussed the focus of the waste management system and its visions for the future. His hope is to focus on Sustainable Materials Management, a systemic approach to waste management proposed by the EPA (EPA, 2018). This framework does emphasize dealing with consumption issues, citing that one of the goals of the approach is to ". . . use materials in the most productive way with an emphasis on using less" (EPA, 2018). Shifting the focus to reducing consumption and waste generation is a major culture shift that will not only take time, but also strong foundational governance that can guide this transition. This culture shift is an idea that is also outlined in the Road to Zero Waste (RTZW) project from 2013, a proposal that recognizes the challenges of waste management in Fort Collins and attempts to outline goals and recommendations for policy and management of the system.

There are many more elements that comprise the WM system in Fort Collins. However, this thesis aims to understand the steps that have been taken to change the governance of the waste

management and how this can guide the transition to a sustainable waste management system. The following section will be using the multilevel approach to transition management to show how Fort Collins is already following similar steps to challenge this dominant regime and to push for change of governance in order to promote a transition to a more sustainable system. Understanding how the current ongoing transition for the waste management system does or does not fit with the approach to governance can show opportunities for improvement and will support and strengthen the argument for the city to fully adopt the multilevel approach for their transition into a more sustainable waste management system.

## **5.2 Current governance practices from a transition perspective**

### ***5.2.1 Strategic Level***

The city of Fort Collins has focused on creating culture change within the organization of the municipality over several decades through discussion of climate action goals and sustainability goals (Anthony & Liss, 2013). The strategic level aims to create cultural change in a community in order to drive the societal transition that is desired. This could be in line with the strategic level aims to create cultural change in a community in order to drive the societal transition that is desired (Kemp et al., 2007). Creating major changes in waste management system in Fort Collins necessitates changes in the behaviors and priorities of the community the societal system is within. In order to create long-term culture change policy and municipal plans need to prioritize and integrate sustainable development practices and sustainable waste management strategies.

In 1999, the Local Action Plan to Reduce Greenhouse Gas Emissions was published with its own solid waste section, addressing how waste could be better managed to mitigate GHGs (*Local Action Plan to Reduce Greenhouse Gas Emissions*, 1999). While this may have been one of the first official collaborations that was published regarding sustainable waste management, there had already been efforts to reduce waste through the Pay-As-You-Throw (PAYT) ordinance which was adopted in 1996. More recognition of a culture change is seen in the RTZW report, in the

“Recommendations” section, where culture change is the first suggestion given (Anthony & Liss, 2013). What is important to note about this is that each of the recommendations in the section are consistent with policies that are already in place with the City Plan, a document that is adopted by City Council that implements policies that govern the development and functioning of the city (City of Fort Collins, 2019). This link to the City Plan means that there has been council recognition for cultural change over a long-term period, specifically when it comes to waste management. The RTZW report advocates for the shift to a zero-waste mentality and advises doing so through awareness, education, training for businesses and non-profits, and reinforcement and compliance. The plan advises positive reinforcement for participation in working towards zero waste goals, but also through assistance with compliance to zero waste policies and ordinances adopted by the city.

The many sustainability plans and proposals that have included waste reduction and management in their reports show a focus within the municipality to have discussion and visioning on how to mitigate the impacts of the WM system on the city and in the global context

Proposal/Plan	Year Published	Brief Description
Local Action Plan	1999	Addressing how the city can take action locally to reduce GHG emissions and impact on climate change.
Climate Action Plan	2008	Strategic plan for 2020 goal for 20% emissions reduction; Measures include community leadership, recycling, energy, green building and transportation.
Road to Zero Waste	2013	Proposal for waste reduction goals of 2020, 2025, and 2030; various recommendations for how to achieve those goals.
Climate Action Plan: Framework	2015	Further development and addition to 2008 Climate Action Plan.
Regional Wasteshed Coalition	2019	Plan for the long-term future of waste disposal and resource recovery infrastructure in Northern Colorado.

Figure 3. Plans and Proposals (including waste management). Source: FCgov, 2019

(see figure 3 for list of reports). Each project and proposal shows a commitment to long-term goals for the city and to creating a transition arena in which goals and objectives can be oriented. It should be noted that not all projects for sustainability and waste management are included in this table. Those that are included were deemed relatable to this particular thesis and research. The establishment of a Sustainability Services department, as well as various sub-departments, also shows a commitment to sustainability within the organization and a culture shift towards emphasizing sustainable development in the city workings. In this view, culture change continues to occur for the internal workings of the city of Fort Collins.

The topic of cultural shifting was brought up in interviews with some of the employees for this thesis. Interviewee CE3 was involved in the creation of the original RTZW plan in 2013 along with CE1. When asked about the cultural impact the RTZW plan has had on the community, the response was:

*“I don’t know if that conversation specifically sparked culture change in the community, but I think it was an opportunity for us to have conversations about where we want to be going [ . . . ] it was pretty clear that a lot of the community wanted us to be ambitious and that council supported being ambitious [ . . . ] I think really the take away to me is it’s more of a statement that we want to make major progress toward waste reduction and a zero waste system. . .” (Interview, CE3, March 2019)*

In terms of sustainable transition management, this sentiment aligns quite well with the strategic level of TM. The RTZW project created a “transition arena” in which actors from various parts of the community could represent their own opinions and perspectives of the waste management system and could have a conversation about what they felt the issues were and how they should be dealt with. The project consisted of 4 Community Conversation meetings, in which representatives from businesses, non-profits, and private citizens were given opportunities to making comments and ask questions about the proposed plan. However, what is striking about her comment is that she feels culture change has not occurred in the community, which is a major element needed within transition management.

While a transition arena has been created by the municipality to facilitate discussion and visioning for waste reduction and management, there has not been a broader success in changing the culture within the general Fort Collins community. Fort Collins does value recycling and has made major efforts over the years to educate and enforce recycling in the community. All city employees agreed in their interviews as well that Fort Collins has a strong and deep commitment to recycling that started in the 1980s (Interview, CE1, CE2, CE3, March 2019). Unfortunately, recycling is only a small piece of the zero-waste vision that the city has discussed in the RTZW and within literature that defines what zero-waste entails (Song et al., 2015).

For the strategic level of governance, the city of Fort Collins has attempted to follow the same tenants of transition management by creating a transition arena for actors to communicate and create long-term visioning and culture change for the future of the waste management system. These attempts have been successful on the municipal level, but the larger Fort Collins community has yet to move on from its sole focus on recycling and into a more zero-waste mentality. Applying social practice theory in this instance can give a better understanding as to why the culture shift is necessary in both the municipality and the community. As the theory ascertains, individual values and norms shape behaviors and practices of the community, which can affect the overall structure of society. The societal structures also have an impact on practices in the community and can change individuals values and norms (E. Shove, Pantzar, & Watson, 2012). Influencing culture change in both community practices and behaviors as well as at the structural municipal level are strong strategic level steps in governance of the WM system that can drive a transition to a more sustainable system. This theoretical understanding also falls in line with the socio-institutional perspective of governance that is used in this paper because it utilizes innovation in routines, policy and practices to challenge the dominant regime and to make a transition possible (Loorbach et al., 2017).

### ***5.2.2 Tactical level***

The city of Fort Collins created a specific department dedicated to the three-pillared ideal of sustainability, and, specifically over the past 5-10 years, they have moved towards collaborating



with each department and with other city planning departments to align agendas that work towards the common goals set in the strategic transition arena. The Sustainability Services department and each of its sub-departments and teams work to synthesize planning efforts and create alignment between proposals and planning projects for city development (FCgov, 2018a). This could be considered as attempts towards implementation of tactical level where the transition agenda is set, depending on the organization/business/institution and its context. Each actor will have its own agenda based on its own goals that fall under the transition arena. The challenge of the tactical level is to make sure that the varying transition agendas interplay smoothly and strongly with one another.

The tactical level also includes working and negotiating with private businesses and NGOs to ensure that their own transition agendas align with the cities. Particularly for the zero-waste vision for the city, there are programs that aim to advise businesses in their own sustainable waste management plans. The Waste Reduction and Recycling Program (WRAP) was created to assist and incentivize businesses in this process and a Community Recycling Ordinance was established in September of 2016 that requires all businesses and apartment complexes to start recycling by 2020 (FCgov, 2018b). The city has also worked with grocery stores in the areas to start compost collection in order to reduce the amount of organics going to the landfills (FCgov, 2018b). The municipality has engaged with private business owners and organizations in the community to align their transition agendas under the goals that have been established by the city in the strategic level.

The recent adoption of the Regional Wasteshed Coalition has also been a massive step in the tactical level of transition management. The coalition was formed to deal with an infrastructure hurdle that the city and other cities in the area were facing; the county landfill is closing in 2024 (Marmaduke, 2019). The city of Fort Collins seized the opportunity to collaborate with the cities of Loveland, Estes Park, and Larimer County in order to create a long-term plan for what is being called the wasteshed, also known as the flow of waste within the region. The agreement between the three cities and the county was titled the Intergovernmental Agreement (IGA) and was passed

unanimously by City Council on April 16<sup>th</sup>, 2019. This opportunity gives the city the chance to collaborate and negotiate with local government actors, private businesses, and community members about planning for the long-term and for sustainability with regard to waste management (FCgov, 2019, 2019a; Marmaduke, 2019). The success of this governance move cannot be determined at this time, but it fits well into the tactical level of governance for transition management very well, as it is establishing networks, coalitions and agendas for a variety of actors invested in the WM system in Fort Collins.

The city is taking important steps in negotiating and collaborating with other stakeholders in the waste management system, which is an integral part of governance using the multilevel approach to transition management. The tactical step for Fort Collins has aligned well with the governance approach from a socio-institutional perspective because it is emphasizing the importance of affiliated policy and regulation approaches for sustainable waste management. While culture change and visioning can change some practices and norms in the community and the municipality, establishing networks and coalitions with larger scale stakeholders and aligning long-term transition agendas is a tactical governance move that reinforces and supports transition to a sustainable WM system (Kemp et al., 2007; Loorbach et al., 2017).

### ***5.2.3 Operational level***

The operational level of the multilevel approach to transition management is characterized primarily by implementation of the agreements, goals and collaborations made in the tactical and strategic levels of management. This is where the planning meets action and innovation. This is a level that, from my research, Fort Collins has yet to explore as much as the others, which can be attributed to the lack of policy adoption and implementation from City Council based on proposals and plans like the Road to Zero that have been created in the past. This argument is supported by the fact that City Council only adopted the general goals within the RTZW plan, and not the more specific and pointed recommendations and implementation strategies outlined in the document (Anthony & Liss, 2013).

It can also be seen based on diversion rates since the RTZW plan was created up until the present. Changes in the physical infrastructural system, as well as the policy implementation side, have not been as drastic as they could have been in order to pursue a transition to a zero-waste focused system. The diversion rates of the community combine all residential, commercial, and industrial waste into one measurement. As seen in figure 2, there was a spike in the diversion rate in the following year after the RTZW was published and the diversion goals were adopted by City Council (Mitchell, 2017). But there is then a significant drop in the following years, with a 12% difference between 2014 and 2017.

There can be many explanations for this loss of progress. The RTZW plan could have created hype around the zero-waste movement that only spiked interest for a year. There are also

### COMMUNITY DIVERSION RATES SINCE 2010

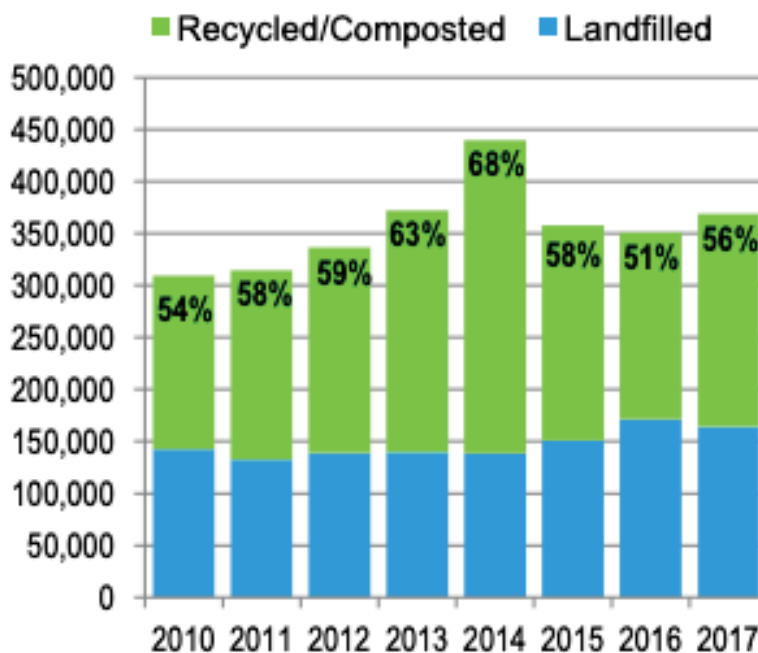


Figure 2. Source: Mitchell, 2017.

complications on how to measure diversion rates. Questions of whether to measure rates for the whole community versus per sector can create varying levels of diversion. For example, for the year of 2017, the community diversion rate was 56%, while diversion rates for the residential sector alone was only 28.7% (Mitchell, 2017). The reason the overall rate was high was because the industrial diversion rate was at 75.5% for the year. Understanding how these diversion rates

are calculated can give a better understanding for where more progress can be made. It is also important to note that industrial waste accounts for 66% of the total waste generated in the community, while residential only accounts for 17% (Mitchell, 2017). So, a higher diversion rate for industrial waste is important, considering it makes up a larger portion of what is being sent to the landfill.

Diversion rates can also be subject to market changes in the recycling industry, which may have contributed to the drop in overall diversion rates from 2014 to 2017. Recyclable materials, specifically various types of plastics, are sold into the recyclables market that is a global trade system. Up until recently, China and many low-income Asian countries purchased recyclables from the US and would process them down into plastic pellets to be reused into new products. It is estimated that by 2016, one-third of US recycling commodities were exported, and almost half of that was sent to China (ISRI, 2018). Policies, including those such as the Green Fence, the National Sword, and Operation Blue Sky, have been set into place by the Chinese government in order to deal with their own plastic and air pollution problems, many of which were exacerbated by the importation of waste and recyclables to the country from the US (Rico, 2018). This has created a crippling effect on the recycling system in the US, in which single-use, low-value plastics are now being sent to landfills because they can no longer be exported (FCgov, 2019a).

This explanation of the exportation of recyclables means to show that markets for these products can be volatile, which can have a major effect on how much waste is being recycled, and how much is being put into landfills (Corkery, 2019; Milman, 2019). This situation also emphasizes a disconnect between local and global scales of waste management. Municipal levels, like Fort Collins, have been reliant on global. Large-scale markets that control the flow of recyclables can have a large impact on municipal levels of governance. In the instance of Fort Collins, because of changes in markets in China, low-grade plastics numbered 3, 6, and 7 are no longer able to be shipped to be recycled (FCgov, 2019a). These plastics are now being landfilled due to this market disturbance. If the recommendations that had been specified in the strategic and tactical stages that are encompassed in the Road to Zero Waste proposal had been carried out over the past 7

years, there may have been infrastructure and policy in place that could have prevented this. With City Council only adopting the goals associated with the RTZW plan, there is no solid and enforced policy that could manage the plastic waste that is being generated and instill the principles of waste generation reduction into the community (Anthony & Liss, 2013).

This relates to the operational level of transition management because it shows a gap in the past years of the city of Fort Collins to implement their own policies of waste reduction and recycling that could prevent export limitations from having such a large impact on diversion rates for the city. Establishing domestic means of processing plastic, glass, metal, and other reusable materials is a means of innovation that operationalizes the plans and negotiations that were made and agreed upon in the tactical and strategic levels of management. Creating opportunities to give rise to these innovations can help the city to operationalize and experiment in order to address this systemic flaw of WM not only in Fort Collins but in the broader WM system of the US.

Interviewee CM1 established a sense of dissatisfaction about the progress the city has made in its attempts at transitioning to a more sustainable waste management system. CM1 has a background in environmental education and has played a part in many of the recycling programs in the city. He represents a voice that is not only from a political and academic background, but also a voice of the concerned citizen in Fort Collins. CM1 has had extended participation in recycling and waste management efforts since the 1980's has given him a broad perspective of what is being proposed in plans such as the RTZW and what is actually getting passed and enforced by City Council. He emphasized in our discussion that "[. . .] what does get done is a fraction of what was implied when plans were passed [. . .]", that lack of policy integration and enforcement steps are 90% to blame on higher levels of local government not implementing these policies (Interview, CM1, March 2019).

This response brings about an important aspect of sustainable transitions in today's environmental state. Urgency for changes to many societal systems has been made apparent, specifically due to the 2018 IPCC report release in October 2018 that stated the world has 12

years until it reaches the “point of no return” in terms of climate change (Allen et al., 2018). The current attempts at change may very well not be quick and precise enough to fit into this urgent state of action. This is inherently in contrast to sustainable transitions management, which is cited as needing generations to take hold and create lasting change. This is a flaw and limitation of transition management and this form of governance. For now, the conflicting priorities of creating long-term culture change but also addressing environmental issues as quickly as possible create one of the largest challenges for the city of Fort Collins when it comes to transitioning into a new waste management system. Dealing with these two different time scales should be a major focus of policy makers in this setting.

### **5.3 Governance challenges for Fort Collins**

There are 5 key challenges in the governance of societal transitions that are outlined by Kemp et al. (2007) that can be considered within transition management. This section identifies those that pertain to the case of Fort Collins’ waste management system.

#### ***5.3.1 Dissent***

Due to variation in understanding of waste management problems as well as solutions to these issues, there can be disagreement as to how which problems are the most critical and how to address them properly. This discrepancy comes about because of varying priorities for public and private sectors and citizen understanding of waste issues. Dissent can be seen in the case of the Fort Collins waste management system in the Community Conversations portion of the creation process of the Road to Zero Waste plan. The notes and comments from these meetings were recorded in 2013, and I analyzed the records for similarities and differences in the comments, which were from a wide variety of stakeholders in the process (see appendix for coding table).

The comments collected during these sessions show both conflict and agreement about what the focus of a sustainable waste management system should be. Some actors were concerned with

how much the system would cost, while others encouraged a raise in tipping fees to promote less waste production at the source. Some felt that there should be bans imposed to deal with contamination issues, while others felt that regulation should only be implemented if absolutely necessary (“No Ban without a Plan”) (See appendix for Community Conversations Coding).

Complex societal problems such as waste management will always have dissent, as it is inherent to the system. However, the manner with which we approach this disagreement can ensure that the key parameters that define the future system that is being transitioned into are met and the same (Kemp et al., 2007). In this instance, continued and reflective discussion and consideration within the community can help all actors agree upon the shared problem definition. Fort Collins has proven to be able to conduct this process, as is shown by the Community Conversations as well. Each plan that the city purposes involves a certain amount of stakeholder communication. The city has also re-demonstrated this in the Regional Wasteshed Coalition, which consisted of the following:

*“A Stakeholder Advisory Group met seven times between May 2017 and September 2018 to provide input and review technical and policy information produced by coalition staff. Over 50 stakeholders were invited to participate from key sectors including: the business community, academia, regional governments, waste haulers and recyclers, boards and commissions, state agencies, and advocacy groups. Coalition staff met directly with local waste haulers throughout the project to seek feedback and discuss impacts on their operations. Staff engaged with numerous boards and community groups and they provided feedback throughout the project. Four open houses were held in May of 2018 throughout the County to educate the public about the topic and seek input to the plan.” (FCgov, 2019)*

Fort Collins has shown that attempts to address dissent have been conducted in the same manner proposed by sustainable transition management (Kemp et al., 2007). This is a successful approach to a governance problem that is considered in the strategic level of the sustainable transition management framework.

### **5.3.2 Distributed control**

According to sustainable transition management, influence over a system can stem from a multitude of different actors, and lack of cooperation and network management can impede long-term structural change (Kemp et al., 2007). Fort Collins has seen issues with this in relation to the work of the departments versus the implementation and policy support from City Council. The prime example of this is seen in the Road to Zero Waste goal adoption. The plan included not only overall diversion goals, but also implementation measures and timelines for how those goals could be achieved. However, City Council only chose to adopt the general diversion goals, which impeded the Environmental Services department from being able to use policy to drive the system towards transitioning to zero-waste.

CM1 emphasized this disconnect between council and higher levels of decision-making with departmental initiatives in our interview. CM1 asserts that the role of the local government is to regulate and protect the welfare of citizens in the community. He feels that City Council's lack of political support for the projects purposed by the Environmental Services department, and the Waste Reduction and Recycling team more specifically, is a major problem in making changes happen. Priorities for the city tend to fall more towards the economically beneficial rather than on improvement of city services for people's health and environmental health (Interview, CM1, March 2019).

Due to differences in priorities between the departments in charge of waste management and the higher level of city government, distributed control is a major challenge for the city of Fort Collins when it comes to changing the waste management system. The City Plan and official adoption of the Regional Wasteshed Coalition show major promise in aligning these levels, however particular caution and emphasis should be on this governance challenge for transitioning the waste management system to becoming more sustainable. As these particular proposals have only recently been adopted, success of their implementation and avoidance of the challenge of distributed control will only be evident with time. This falls in with the tactical



level of the multilevel approach to sustainable transition governance, as it demonstrates collaboration and negotiation with multiple actors and levels of governance in the community. Implementation and experimentation of these new proposals and agreements fall into the operational level, but attention should be paid to the agreements made within the tactical level. This give transition management the element of reflexivity that is key in the management of change in societal systems.

### **5.3.3 Determination of short-term steps**

The connection between long-term change and short-term steps presents a major gap in sustainable transition management literature and theory. Utilizing the experimentation and innovation aspects of the operational level can be ways of attempting change with smaller scale initiatives. This challenge can relate well with social practice theory because it emphasizes an area that needs development in transition management. Looking back into social practice theory, this quote can explain an importance of what could be considered smaller, shorter-term actions:

*“The sum of the individuals executing the practice and the way they do this ultimately determines the nature of the practice. Thus, by influencing or manipulating the elements, you can alter the practice and consequently the behaviour of large groups of people.” (E. Shove et al., 2012)*

Social practice theory emphasizes that every day, short-term behavioral changes still play a role in transitioning the societal system into a new structure. These “smaller” steps can be seen as more geared towards cultural change of the perspective of waste management, something that the city of Fort Collins needs to take into consideration (E. Shove et al., 2012).

Over the past few decades, a culture of responsibility for recycling has been established with residents and some businesses in the community, as well as being a major portion of the waste management system (Interview, CE1 and CE2, March 2019; (Anthony & Liss, 2013). However, the city has not done enough to fully promote the incorporation of smaller behavioral changes that promote zero-waste in the community and in the private sector. The point of this is to identify

useful, “[. . .] short-term actions which generate useful lessons and facilitate further change” (Kemp et al., 2007).

While a full change of culture surrounding consumption and waste generation is a large adjustment the community has yet to fully complete, there have been varied attempts from the city to promote small means of behavioral changes that can lead to long-term system changes. The SHIFT campaign from the Climate Action Plan team started in the spring of 2019 is giving people information on small changes they can make in their lives to reduce overall emissions in the city (FCgov, 2019b). The city website (fcgov.com) also provides information regarding home composting efforts, food waste reduction tips, and recycling information to explain why recycling is so important in a WM system (FCgov, 2017, 2018a, 2019a). There have been short-term steps to attempt culture change in the city and it is an aspect of change that the city is focusing on in the coming projects for the waste management system (Interview, CE2, March 2019).

#### ***5.3.4 Danger of lock-in***

Lock-in is the issue of becoming constrained by the initial chosen solution to a problem and not being able to adapt solution methodology in future scenarios. Providing multiple options for solutions to problems would enable flexibility in the future to adapt and ideally bridge the current socio-political scenario with the future vision for transition (Rotmans, Kemp, & van Asselt, 2001). Based on the research conducted for this thesis, the area in which Fort Collins should be cautious is assigning a specific label to the sustainable waste management plan that the city is transitioning into. Labeling the plan as “zero-waste” or as a “circular economy” may constrain options for solutions in the future in order to fit a specific model of waste management, when it may not be the optimal method of solution.

CE2 revealed that there is an understanding that the labeling of the solutions and plans for waste management have meaning and impacts behind them. He says:

*“How you talk about an issue influences how you think about it, you communicate it to the public and decision makers and businesses, and it impacts the way that decisions are made and policies are set.” (Interview, CE2, March 2019).*

CE2’s awareness of the fact that the titles and frameworks chosen for these projects can have a constricting effect on how solutions may be approached in the future. It is important to revisit the challenge of distributed control in this section, as the awareness of this impact may not be as high in upper levels of the local government. A possible future issue may be disagreements between what was agreed upon during the tactical and proposal stage and whether those steps are working well for the system in the long run. While using specific methods of waste management that have been proposed can be useful for short-term changes, adhering to a specific method with no opportunity for change can create major challenges in maintaining and increasing sustainability in the WM system(Kemp & Loorbach, 2006).

Fort Collins has presented Zero Waste as the ideal for sustainable waste management in the community. However, discussion of changing that title have shown uncertainty of the applicability and accessibility of the plan (interview, CE2, March 2019). Change of the labeling of the sustainable WM system is currently being discussed. The emphasis on this governance challenge is the allowance of flexibility in all levels of the governance structure and the openness to exploration and experimentation. Making sure that the management of the system is consistently aligning with the SDGs and sustainable development while providing room for reiteration and change is vital. This perspective can prevent lock-in issues in future implementation of the sustainable waste management system of Fort Collins.

### **5.3.5 Political myopia**

The adoption of the new City Plan and Regional Wasteshed Coalition show promise for the city of Fort Collins and the transition to a sustainable waste management system. The larger, umbrella City Plan incorporates and references the sustainable development goals of the waste management system but does not specifically commit to any in particular. The challenge that I

argue might be arising in this scenario deals with the current political emphasis on economic growth and development. Fort Collins is dealing with an increasing population influx and there is a large emphasis in the City Plan on job development and strengthening the local economy (*Fort Collins City Plan*, 2019). The political climate in the US is currently quite volatile, which has created large amounts of tension when it comes to responses to climate change and environmental degradation (Bolsen & Shapiro, 2018; Shamus, 2017). Heavy focus in the current presidential administration focuses on economic development and increasing production, which both can have heavy impacts on waste management systems in cities across the country (Bolsen & Shapiro, 2018; *United Nations*, 2011). There is potential for shifting to even more focus on economic growth, which could interfere with the sustainability goals of the waste management system in Fort Collins. Political myopia in transition management discusses the challenge of overcoming short-term political changes in order to reap long-term results (Kemp et al., 2007). Policy-makers and stakeholders involved in the changes being made to the waste management system must be under strong agreement that fundamental change is needed and that goals need to be met to make those changes, regardless of changing political cycles. The transition arena, which was discussed in the strategic level of management, can assist with this challenge by creating a space outside of those short-term political cycles to support the long-term goals for fundamental change (Kemp et al., 2007).

The multilevel approach to transition management governance as well as the governance challenges gave this thesis the ability to assess the current situation of the transition of the waste management system in Fort Collins. Revealing what has been successful and what is lacking in the governance of the transition allows the city to improve the process by which the change is occurring and to better manage outcomes of various sustainable waste management plans the city purposes.

## **5.6 Sustainable transition management for the city of Fort Collins**

Sustainable transition management provides a theoretically grounded framework for the city of Fort Collins to base their planning and policy implementation off of. The issues that give rise

because of the current waste management system in the US and, more narrowly, in Fort Collins, require long-term transitions into new systems that involve culture change and policy change as well. Transition management is not a quick fix for waste management issues, but rather a commitment to structural change for the benefit of those in the future.

As Fort Collins has claimed to have a systemic view of the waste management system, full adoption of the theoretical framework of sustainable transition management and social practice theory could give the city a better understanding of the challenges previously mentioned and how to tackle those challenges (Anthony & Liss, 2013). Transition management creates a strong focus on long-term goals and gives flexibility in how those goals can ultimately be achieved. The framework promotes experimentation and innovation in a way that can challenge the traditional regime of waste management in the US and ultimately change that system (Frantzeskaki et al., 2012; Kemp et al., 2007). The process also emphasizes reflexivity, which could help the city to continuously evaluate if the governance practices are leading towards the sustainable waste management system that is desired. As the transition management cycle has framed the assessment of the current stage that Fort Collins is in, it can also aid in developments in the process that can create more positive sustainability outcomes for the waste management system in the future.

The Sustainable Development Goals from the UN can be linked back into this discussion surrounding changes to governance in the WM system in Fort Collins. Policy implementation and regulation are major governance challenges that the city faces, which tie into the distributed control, lock-in and political myopia challenges that were presented previously. Without proper policy integration and enforcement of sustainable WM practices, the city will be unable to achieve goals 11.6 and 12.5 by the determined deadlines. As previously mentioned, the city also aligns much of its planning and governing under the three-pillar ideal of sustainability. This framing falls in line with what the United Nations considers to be sustainable development. Within the sustainable development agenda for the SDGs, economic growth, social inclusion and

environmental protection are included and fall in line with Fort Collins' standards for sustainability as well (FCgov, 2018a; "The Sustainable Development Agenda," 2019).

Having the transition management perspective can help the city, and other cities looking to make changes, to pinpoint gaps in their management plans and to promote reflexive governance practices that evaluate efficiency of plans over time. It brings an understanding of how infrastructure, organizations, communities, policies and many other elements interact in a social system, which can help entities like the municipality of Fort Collins to better tackle the "wicked" challenges of waste management in the United States. In order to meet the SDGs set that relate with waste management, a broad systems management perspective and integrative solutions must be maintained. Actor collaboration is also key in achieving these goals, both at the local and global level (Gustafsson & Ivner, 2017). These key factors align well with transition management, as it emphasizes multilevel solutions and collaborations, as well as broad, long-term scopes for the goals (Kemp & Loorbach, 2006).

Cities like Fort Collins that have made commitments to their own sustainable development goals that relate to the SDGs would be able to benefit from the transition perspective as well. As demonstrated, Fort Collins has already followed some of the cyclical elements of transition management and reflexive governance to make changes to the current system and to the culture surrounding WM in the city. The successes experienced thus far demonstrate how fully utilizing the reflexive governance approach of transition management could also be applied to other cities in the US that want to make long term changes to their WM systems. Governance challenges can present major roadblocks in being able to achieve sustainability goals that are connected to the SDGs. Transition management provides recursive structure and method to these societal systems, which can help cities to overcome these challenges (Gustafsson & Ivner, 2017; Kemp & Loorbach, 2006).

## 6 Conclusion

Transition management is a framework of reflexive governance that can help municipalities and cities in the United States to tackle the governance challenges that come with changing to a more sustainable waste management system. As this system aligns with the Sustainable Development Goals developed by the United Nations, integrative solutions and multilevel governance are key elements in both the SDGs and transition management, making the framework compatible with the SDGs regarding WM. The application of the multilevel governance of transition management to the city of Fort Collins demonstrates how elements of the framework can be successful and how the framework is able to show gaps in the systems where change is needed.

For Fort Collins, success has been seen in the integration of sustainability into the culture of the municipality and into the proposals and plans that are created for the development of the city. The city has also been successful in dealing with challenges of dissent and determination of short-term steps, as spaces for discussion have been opened to multiple actor groups and opportunities for education and small-scale behavioral change have been created for the community. However, the city still has struggles of implementing policy changes for more sustainable WM practices throughout the community. The distribution of control over policy-making is seen to have been a major challenge for the city, in addition to possible challenges with political myopia and lock-in in future scenarios. Long-term utilization of the strategic, tactical and operational levels of transition management present Fort Collins with the opportunity to provide structure and reflexive governance to the WM system in the city. This cyclical, recursive method would be able to aid the municipality in overcoming governance challenges in the journey towards a sustainable WM system.

Using transition management to guide governance changes in a municipality's waste management system necessitates patience. Long-term goals and changes are the guiding point within transition management and transition perspective. The shorter-term changes that are made to existing systems facilitate a larger scale transition into a system that is holistically more

sustainable than the previous one. Fort Collins is currently making changes to their own waste management system and determining whether the system is sustainable in an objective sense is not something that this thesis aims for. The aim is rather to use reflexivity and reevaluation to assess how a system has progressed and how changes can be made in order to tackle governance challenges that are keeping the system from its goals.

Fort Collins can be seen as one of many cities in the world struggling and fighting to improve their waste management practices to become more sustainable. Action to address the issues that stem from waste management in the United States is vital in working towards sustainable development goals. Waste generation is contributing to a variety of environmental problems that cities, countries and the world are currently facing. As municipalities are at the center of policy-making and management for the waste management system, reflexive governance is all the more important for cities like Fort Collins to take into consideration.



## 7 Appendices

### Appendix 1: Recycling and Trash Ordinances for Fort Collins

Ordinance	Adoption Year	Purpose
<b>Cardboard Ordinance</b>	2013	"All entities that use cardboard in Fort Collins are included in the ordinance, such as residents, businesses, and industrial operations. Cardboard may be recycled or reused or composted, but may not be placed in the trash for landfill disposal."
<b>Pay-As-You-Throw Ordinance</b>	1996	Trash is billed based on the size of the trash receptacle. Recycling is offered by haulers at no additional charge. Haulers must mail educational flyers with recycling guidelines from the city at least once a year. Applies to single-family homes.
<b>Electronic Waste Ordinance</b>	2007	Banning the disposal of e-waste in the landfill (passed law in Colorado in 2013)
<b>Trash and Recycling Enclosure Requirements</b>	2004	". . . amended the Land Use Code in 2004 to require that trash enclosures be designed and built with sufficient space to accommodate recycling in all new commercial or multi-family housing construction. With this requirement, the City ensures that future tenants or occupants who wish to recycle are not constrained by a lack of space."
<b>Construction and Demolition Recycling Requirements</b>	2012	"For new buildings and additions over 2,500 square feet or remodels over 2,500 square feet, a construction waste management plan acceptable to the building official that includes recycling of concrete and masonry, wood, metals and cardboard, is required at the time of application for a building permit. The construction waste management plan shall be implemented and conspicuously posted on the construction site. Compliance shall be certified by the hauler through receipts and signed affidavits. Substantive changes to the plan shall be subject to prior approval by the building official."
<b>Zero Waste Goals</b>	2013	"On December 17th 2013, Fort Collins City Council adopted Resolution 2013-111 establishing a waste diversion policy that would help the city meet its zero waste goals. The plan calls for 75% waste diversion by the year 2020, 90% by 2025 and 100% or "Zero Waste" by 2030.

Recycling/Trash Ordinances for Fort Collins. *Source: created by Sarah Hite; information from FCgov, 2019. Recycling and Trash Ordinances.*

Appendix 2: Community Conversations Coding Table

Concern for Cost of Waste	Raise Tipping Fees	Composting Infrastructure	Packaging	Contamination	Central Locale for Materials (Resource Recovery Park)	More Stakeholders	Education	Domestic Markets for Recyclables	Easier System	"No Ban without a Plan"
Nancy Agnew (Once Again Thrift)	Dan Garvin (CO Iron and Metal)	Randy Van Winkle (SBM)	Richard Kommusch (Sierra Club)	Stacey Baumgard (CSU)	Jeff Schmid (Always Sharp)	Matt Gibbs (Fgov)	Phil Friedman (NRAB)	Anita Comer (Waste-Not Recycling)	Mark Houdashelt (Citizen)	Bob Mann (NRAB)
Tony Cooper (Eco-Thrift)	Jan Harrison (Citizen)	Jan Harrison (Citizen)	Mark Houdashelt (Citizen)	Steve Derrus (WM)	Todd Loose (Waste-Not)	Jan Harrison (citizen)	Steve Derrus (WM)	Janice Oldemeyer (IT Refresh)		Nancy Agnew (Once Again Thrift)
Greg Woods (Work Space Innovations)	Mike Preznick (Citizen)	Matt Gibbs (Fgov)		Todd Loose (Waste-Not)	Dianne Ewing (Avego)		Stacey Baumgard (CSU)			Tony Cooper (Eco-Thrift)
	Erin Nuckols (Institute for the Built Environment)	Todd Loose (Waste-Not)		Randy Van Winkle (SBM)	Bob Yost (A1 Organics)		Randy Van Winkle (SBM)			
		Tony Cooper (Eco-Thrift)			Greg Woods (Work Space Innovations)		Nancy Agnew (Once Again Thrift)			
		Vara Vissa (Citizen)			Anonymous		Kendol Gustafson (ReSource)			
		Sheela Backen (CSU)					Tony Cooper (Eco-Thrift)			
		Bob Yost (A1 Organics)					Erin Nuckols (Institute for the Built Environment)			
		Liz Pruessner (NRAB)					Anonymous			
		Michael Baute (Spring Kite Farm)								
		Anonymous								
		Bob Mann (NRAB)								

### Appendix 3: In-person Interviews

	Title	Relation to FC	Sampling Method
CE1	Environmental Program Manager, Waste Reduction & Recycling	Employed by city since 1989	Purposive
CE2	Environmental Planner, Waste Reduction & Recycling	Employed by city since 2015	Purposive
CE3	Senior Environmental Planner, Waste Reduction & Recycling	Employed by the city since 2011	Purposive
CM1	Former mayor and city councilman; concerned citizen	Involved in several major recycling initiatives in the city	Snowball (referred by CE1)

Figure 2. Interview Information Table. Source: Sarah Hite/Interviews

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