

Bringing in the Garbage: Opening a Critical Space for Vehicle Disposal
Practices

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ABSTRACT

This dissertation examines the relationship among practices and policies of waste/ing and economic structures to make visible the implications of vehicle disposal policies for environmental policy and theory. Consequently, I attempt to build upon the small body of literature that is now critically engaging with waste production and resulting actions/inaction in the form of policies of management. In doing this I use waste as a lens to examine the interrelationships among environmental degradation and economic and political structures. Further, I examine these phenomena in relation to a physical object, the automobile, to add materiality to abstract notions of waste as it relates to both the political and the economic. Through vehicle recycling policies, I analyze how underlying economic structures in contemporary capitalism result in specific responses to the “problems” of waste as well as how the related responses, or “solutions” perpetuate an un-ecological industrial system which severely restricts the possibilities of making substantial change in the production of environmental harms.

DEDICATION

This dissertation is dedicated to my advisor and mentor Timothy W. Luke. Thank you for introducing me to critical environmental political theory.

I will forever brag about my wonderful graduate experience due predominately to your enduring support, critique, and humor.

This dissertation is also dedicated to several important people in my life:

To Mrs. Maureen Williams (aka Towanda the Avenger) my hero and mentor. Thank you for encouraging me to be the strong and passionate person I am today.

To my bears. I love you. Thank you for the never ending reassurance, inspiration, and/or always keeping my chair warm.

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DISSERTATION ABBREVIATIONS

1991 Packaging Ordinance: Ordinance on the Avoidance of Packaging Waste

94/62/EC Packaging Directive: European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste

1998 ELV Ordinance: Ordinance on the Disposal of End of Life Vehicles and the Adjustment of Provisions under Road Traffic Law

2000/53/EC ELV Directive: European Union 2000/53/EC End of Life Vehicle (ELV) Directive

2002/95/EC RoHS Directive: Directive on the Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment 2002/95/EC

2002/96/EC WEEE Directive: European Community directive 2002/96/EC on waste electrical and electronic equipment

2008/53/EC Waste Directive: Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

ANT: actor-network theory

ASR: automotive shredder residue

BMU: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

DSD: *Duales System Deutschland*

EOL: End of life

ELV: End of life vehicle

EPR: Extended Producer Responsibility

EU: European Union

MRF: Materials recovery facilities

OECD: Organization for Economic Co-operation and Development

PRO: product responsibility organization

RCRA: Resources Conservation and Recovery Act

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CHAPTER ONE

Waste Disposal, the Auto, and Praxis

1.0. DISPOSAL, THE AUTOMOBILE AND CONTRIBUTIONS TO THE RESEARCH

This dissertation examines the relationship among practices and policies of waste/ing and economic structures to make visible the implications of vehicle disposal policies for environmental policy and theory. Consequently, I attempt to build upon the small body of literature that is now critically engaging with waste production and resulting actions/inaction in the form of policies of management. In doing this I use waste as a lens to examine the interrelationships among environmental degradation and economic and political structures. Further, I examine these phenomena in relation to a physical object, the automobile, to add materiality to abstract notions of waste as it relates to both the political and the economic. Through vehicle recycling policies, I analyze how underlying economic structures in contemporary capitalism result in specific responses to the “problems” of waste as well as how the related responses, or “solutions” perpetuate an un-ecological industrial system which severely restricts the possibilities of making substantial change in the production of environmental harms.

Adding specificity, this research assesses these issues in relation to the implementation of the *European Union 2000/53/EC End of Life Vehicle (ELV) Directive* in Germany.¹ This directive uses a particular policy practice, namely, extended producer responsibility, to understand the implications of government attempts to force the

¹ From this point forward this directive is referred to as the 2000/53/EC ELV Directive.

internalization of common externalities, most prominently in this example that of waste management, in the production process. In this case, the material of focus for disposal at end of life is the automobile. By making the producer of the automobile responsible for its disposal, this policy of extended producer responsibility, the 2000/53/EC ELV Directive, attempts to encourage design change in the automotive production process to encourage end of life recycling and reuse. This policy is one of promoting product “design for recycling.”

My research is an effort to determine if this design change has taken place and why (or why not). I develop a method of analysis that looks to the “meso-level” in order to connect the circuits of production (productive capital) to the process of disposal at end of life. I use this method to understand the flows of capital in the production process and consider the potential for change through policy mandates. Finally, given the limitations of the 2000/53/EC ELV Directive, I propose spaces of opening up change in automobile production that might lead to vehicle redesign for reuse and recycling purposes.

To understand the process of material production and disposal, however, it is important to first understand how individuals and societies construct concepts of waste and wasting, as waste is a socially determined category. The conceptualizations and regulations of waste today are intertwined and a result of changes in production, consumption, and disposal following the Second World War. This research explores waste/ing in historical context from 1945 to the present in relation to the general experience of Western Europe and the United States as these states follow the same trajectory in waste production and management. I expand upon themes pulled from this literature throughout this work.

This initial chapter poses three questions to provide an overview for the project. First, I focus on the question of why it is important to examine waste and disposal practices both theoretically and materially. Focusing on the object is crucial, and my examination is unique in comparison to the existing body of literature. Next, I address the question of why it is appropriate to study the relations of disposal through an expensive object that is not typically associated with daily/individual/consuming notions of waste: the automobile. Finally, I discuss the importance of this project to the existing literature along with how this research may be expanded in future work.

The second section of this chapter outlines the framework of the project. I map out the chapters of the dissertation and explain how each builds upon the previous to create an understanding of waste/ing with considerable theoretical underpinnings. I then provide an explicit route for the reader to understand the goals and scope of analysis. This chapter therefore serves as the foundation building out my designs behind the motivation, importance, and format of the dissertation.

1.1. FRAMING THE RESEARCH PROJECT

1.1.1. The importance of materiality: waste theory

Almost all manufactured objects eventually are disposed. Disposal occurs for a variety of reasons: an object is broken, used up, out of date, out of fashion, or perhaps the owner believes initial or a modified use value has disappeared. “Disposal” for the individual who decides to rid herself/himself of the object may take such forms as donation, gifting (or re-gifting), long-term storage, dumping (perhaps illegally), recycling, incineration, or landfilling. Although visible and tactile in the actions as

described above, much of how we dispose and what we consider “waste” is hidden, remains unseen, or is simply un contemplated.

It is usually in the home, in one’s everyday life, that individuals physically and intimately encounter waste and engage and participate in the act of “wasting.” These micro-level actions are ones of cleansing (spring cleaning), necessity (ending the sickening smell of rotting food), or desire (ridding yourself of the old model to make way for the new). They elicit feelings of accomplishment, sadness, and/or the manifestation of additional “wants.” Wasting is an action undertaken by all races, classes, and genders. It is timeless. It is indispensable. It is equalizing and simultaneously stratifying. It is also satisfying: “liquidation as liberation.”

Determining how and when an object is to be disposed, when it is to be waste/ed, is not simply an individual, micro-level decision. Such agency is influenced and mediated by and through external forces. Governments mandate modes of disposal through landfill regulations, recycling requirements, the structuring of collection methods, and product production regulations. Producers pre-determine time and opportunities for disposal through product design or the designing of new products. Production practices operate within the confines of the economic structure. It is the individual, though, who determines how and when to begin the process of disposal of an item. In this first step on the micro-level the individual determines whether to follow established rules/norms, elect not to participate by leaving an item in an indefinite state of transition, or dispose of a material through illegal or illicit means. While individuals physically begin the process disposing of material no longer desired, the practices of disposal are a visual manifestation of an entire complex of economic and power relations that circulate within

and are managed by government, industry, and society. These groups each act and interact within a space of social norms that promote and discourage forms of behavior taken towards waste (de Kadt, 1999; Hetherington, 2004). Regimes and technologies of disposal are connected through forms of knowledge that identify “waste” and signal disposal responses.

Regimes, responses, and resulted/ing material objects, within the context of waste/ing, though, remain fairly unexamined, unproblematized, and under theorized in academic literature and social critique. It is only in recent years that the volume of waste literature has grown, and with it more comprehensive attempts to understand why and how wasting occurs (Scanlan, 2005). The literature assessing waste/ing today is often divided, problematically, into either micro- or macro-level analysis. While waste is individually created (for example, the individual, having used the contents of a container, and tosses the empty container into the garbage bin or the micro-level), the tangible and theoretical implications produced by the wasting process are left to “others” to manage (the macro-level). While both of these are components of the wasting process, what is missing in the literature is the connection between the two and an understanding of the effect of macro systems on individual agency and functioning of micro activities within the macro structure. This is important because an incomplete conceptualization of both the “problem” of waste and resulting management “solutions” results from the lack of understanding of the connection between micro-level acts of disposal and the macro-level system that designates how wasting will occur. Policies that attempt to effect change, then, may actually be ineffective.

The existing waste/ing literature within the social sciences focuses predominantly on practices of consumption and consumerism, implying the end result of waste but neglecting to explore the act, implications of, and manufactured necessity for and of wasting (Hetherington, 2004). This literature also fails to critically examine the role of excess and surplus, the necessity of waste creation within current economic structures, and the importance of desire in mediating the relations. While there have been attempts to “make visible” waste/ing through tracing categories of disposal,² the conceptualizations identified remain limited and without a defined body of literature or even a framework for intellectual examination (Riley, 2008, p. 14; Scanlan, 2005).

It is important, therefore, to problematize, conceptualize, and understand what is considered waste and the implications and processes resulting from this designation to understand how complex waste policies such as the 2000/53/EC ELV Directive in the European Union impact the disposal process of automobiles. The examination of wasting/disposal in this general, social frame provides insight into the relationship among industry, nature, and labor. It provides ways of understanding the built and “natural” environment. It helps to illustrate how waste is “all at once, all mixed together: work, nature, land, production, consumption, the past and the future” (Rogers, 2005, p. 3).

Several themes run through this dissertation. Three of the most important are identified in the following section, framing this work. As an introduction to these themes I define and describe how waste is positioned within academic literature. I then examine waste within the context of the mediation of desires, and how lack of desire for objects facilitates the designation of objects as “waste” and the resulting implications of this

² See for example Thompson (1979).

designation. This is important because much of the critical waste literature begins with desire as a foundation for consumption, tying practices of waste/ing to consumption. I illustrate how this focus on consumption rather than production is problematic. Next I examine governance, power, and waste/ing relations to provide an understanding of the role of the political in managing waste. The case study in this dissertation focuses on a specific political/policy response and this section further illustrates the usefulness of this example. Finally I explore waste/ing within the context of excess and the necessity of the creation of waste within an economy operating. This conceptualization of excess is used to challenge the current environmental discourse of scarcity in an attempt to open potential spaces for change in policies of waste management. While these discussions are broad, they serve to provide an understanding of why this research is important.

1.1.2. Waste/ing: the automobile and related policies as the object of study

This dissertation utilizes the automobile to add materiality to the abstract concepts of “waste” and “wasting.” The automobile is an interesting, appropriate, and useful object of study in exposing relations of disposal. Symbolically and physically the automobile is a key element of modernity. It is fundamental to the shaping of everyday life both culturally and physically. Theorists have consistently identified the car as an object as playing an essential role in perceptions of status, the facilitation of macro- and micro-level consumption and production, and the altering of the modern landscape. Lefebvre (1984, p. 102) notes that the automobile, beyond its role of transportation, is a “leading object” central to culture in modern society, fixing everyday life into certain positions. Mumford (1934) identifies the physicality that the automobile as an object plays in the unquestioned role of the organization of cities, space, and commerce allowing the

freedom of “flight” from urban centers. Jean Baudrillard (1981a, p. 174) recognizes how the body style of a car identifies car age or newness, and the style of one’s automobile become a sign for sex and status in a form of “unconscious discourse” emphasizing the role of desire in consumption. John Kenneth Galbraith (1998) emphasizes how the automobile embodies modern ideas of production including Fordism, Taylorism, and Sloanism. Each of these conceptualizations can be linked to Thorsten Veblen (1998) and Georges Bataille’s (1988) notions of excess and wasting as purposeful excess with the car as the chosen means of mediation of this process.

The automobile maintains an unquestioned role in the organization of cities, movement of people, and facilitation of commerce (Mumford, 1934; Paterson, 2007). Automobility (autonomy + mobility) is “one of the principal socio-technical institutions through which modernity is organized” and the auto is unchallenged in its transportation dominance (Böhm, 2006, p. 1; Paterson, 2007). Additionally the production and operation of automobiles are highly regulated activities. Air quality standards, fuel standards, and safety features, for example, are requirements of a system of networks controlling interactions with and through the auto. It is therefore conceivable that this form of regulation may and can be applied to the end-of-life period of the automobile.

The auto also plays an important role in economic relations as a fundamental component of the global transportation system (Paterson, 2007). Even if you do not own a car, your life is inherently tied to automobiles and trucks through the movement of goods, services, and people in and around your existence. Automobile manufacturing is linked (through production facilities) to the domestic economies of most countries, and is used as a determinant of economic health and growth in international political economy

literature. Massive infrastructure investments in road systems and related built structures support governments by facilitating product movement for a healthy economy and support of internal and external military/defense. These structures, fully entrenched in daily life, are difficult to remove from society, and we can therefore assume their existence in the immediate future.

Environmental implications of the auto are great as well. Although most automobiles are fueled by a resource (oil) that is becoming increasingly expensive to supply while at the same time contributing to the emissions of global warming gasses, it is likely in the foreseeable future that the auto will maintain its dominance as a mode of transportation. This dominance might be accompanied by an already occurring shift in the dominant fuels used to power the auto. Alternative forms of fuel such as electricity or biofuels will continue to power new models. This shift in fuel sources creates added incentive to study the automobile, if new fuel technologies become the norm, millions of older, gasoline-powered cars eventually will be slated for quicker disposal.

Automobiles are the target of at least some form of disposal waste policy in almost all industrialized countries. The 2000/53/EC ELV Directive of the European Union is one of the most comprehensive examples of a state policy directing vehicle management at the time of disposal in its member states. This directive first structures, but does not specifically dictate, how individual member states will incorporate end-of-life vehicle disposal regulations into federal legislation; and, second it establishes reporting requirements for each member state to document how they are meeting these new requirements.

Germany serves as a best case of analysis for the implementation of this directive for several reasons. First, Germany has served as a pioneer in the development and implementation of auto recycling policies. The 2000/53/EC ELV Directive is modeled on German legislation dating back to the 1990s. Additionally, the directive incorporates policies of extended producer responsibility, utilizing the “polluter pays principle,” in several other pieces of legislation. The polluter pays principle is also a key feature of German environmental policy. From the manufacturing perspective in that it is the home to five major brands: BMW, Mercedes-Benz, Volkswagen, Opel, and Audi and the lobbying organizations for these companies, the *Verband der Automobilindustrie* and ARGE-Altauto Committee, that have played important roles in state and European Union level policy negotiation and implementation. Finally, Germany today holds a position of the central player both politically and economically in the European Union. While this dissertation examines implementation of practices on the state level, the influence of these practices in a country as powerful as Germany in the European Union clearly seems to have some level of influence over state level implementation of other member states.

While the object of analysis in this research is the automobile, this study affords insights beyond automobiles. This research provides a methodological framework based in theory, policy, and practice that may be applied to other products - including those disposed of on a daily basis. Consequently, the networks and structures of power this research makes visible are not limited only to relations of the production, consumption, and disposal of the automobile, but could apply broadly to more objects.

Finally, and perhaps most importantly, the automobile is the central focus because its product cycle is mature and stable. Unlike most consumer objects, there are a limited

number of companies producing automobiles, especially in the global context. The automobile is a fairly uniform product, and all countries encounter similar barriers and opportunities for disposal. In this context, one can understand more fully the theoretical and policy implications of disposal.

1.1.3. Contribution of the research

This research is meant to provide ideas for future exploration in three areas: environmental political theory, environmental policy, and discard studies (an emerging interdisciplinary field). Waste remains a fairly neglected topic theoretically. The associated body of literature rooted in critiques of consumption arising in the post-World War II era tends to focus on a critique of disposal/disposability through modernization and affluence.³ More recently, theoretical waste/ing literature begins to explore conceptions of waste in the role it plays in society (rather than as simply a result of consumption) but with little regard for the necessity of waste or expenditures of excess within economic structures.⁴ This work tries to add to this body of knowledge.

This study also recognizes the identification of several important and often disregarded areas of focus in examining the implementation and effects of waste management policies. First, while the object of study is the automobile, the categories used to study vehicle disposal can be applied to the disposal of consumer products including electronic equipment, appliances, and packaging. For each of these product categories, the European Union has instituted a similar waste management strategy. What

³ See for example the work of Cooper (2009), Strasser (1999) and Robinson (1990). This literature is specifically described in the second chapter.

⁴ See for example the work of Gille (2007, 2010). This literature is described in the fourth chapter.

is important in studying waste management policy in this way is the examination of existing power relations (or lack thereof) in relation to product disposal.

Second, over all, there is a lack of literature critically assessing vehicle disposal policies.⁵ This research, through interviews conducted with representatives of automotive companies, provides new insight into the impact of end-of-life vehicle regulations on industry, the target of focus of the 2000/53/EC ELV Directive. This dissertation utilizes information gathered through interviews conducted in Germany in the fall of 2010 with representatives from Opel, Ford, Volvo, BMW and Hyundai. The interviews add depth to the exploration of the application of vehicle disposal policies missing in many existing policy analysis studies.

Finally, in this dissertation, I develop a meso-level analysis to provide an understanding for why policies of extended producer responsibility can be ineffective in effecting the target of the policy: changing vehicle design. While most waste research focuses on the micro or the macro-level of relations at the expense of understanding the interplay between the two, the meso-analysis developed in this work speaks to a needed gap in the theorizing of waste. This analysis, while using a specific example in this research, is designed for broad applicability beyond the 2000/53/EC ELV Directive.

1.2. DISSERTATION OUTLINE

A lack of critical waste research creates an opening for both theoretical and policy-based explorations of waste and disposal. This dissertation focuses both on the positioning of waste in the economy as well as the material results of policy

⁵ This argument is further described in the third chapter. Assessments of vehicle disposal policies generally focus on implementation rather than questioning the logic of the policy.

implementation. Consequently, the argument is developed chapter by chapter in this order:

- 1) Waste disposal, the auto, and praxis
- 2) Waste and theory: theories and/of waste/ing
- 3) Policy responses to waste management: extended producer responsibility
- 4) Meso-level analysis: creating a theoretical framework
- 5) End-of-life vehicles: meso-level waste analysis and the German experience
- 6) Disposal approaches: opening a space for alternatives?
- 7) Conclusion and recommendations for further theory and practice

I begin chapter two by reviewing the existing literature used for theorizing waste, wasting, and disposal. I examine how objects of consumption become objects of disposal when they are no longer desired. Rooted in the work of the Frankfurt School, and expanding into other post-World War II critiques, consumerism literature provides a basis for the modern understanding of objects of consumption. This body of literature, however, tends to avoid the conclusion of consumption in the form of disposal - a practice that is inherently linked to, informed by, and in turn informs, consumption. It is important to include missing problems: the positioning of waste within society, waste as a necessary result of the system of production, the economy engulfing waste, and the connection between waste/ing and excess. A limited body of interdisciplinary disposal literature has emerged to address these notions within the fields of anthropology, geography, sociology, and political science. These works are reviewed and applied to the body of consumption literature in an attempt to create a deeper understanding of how objects of consumption are problematized as undesirable, and therefore disposable. Within the theoretical basis for conceptions of waste, I also explore the automobile as the physical manifestation of an object. Yet, the auto becomes undesired (waste) and the embodiment of characteristics/qualities of modernity. With speed and mobility, and as a

vehicle of and for increased consumption, the automobile has defined, characterized, and structured social, political, and economic organization in the past century. This cycle of use creates a basis from which to utilize the object of the automobile in the examination of economics, policies, and socially constructed patterns of waste/ing.

Chapter three introduces one form of governmental action in the management of undesired objects: extended producer responsibility (EPR). Policies of extended producer responsibility shift disposal responsibility from the individual user/buyer to the producer of the product with the goal of encouraging the embedding of alternative disposal opportunities within product design. Reflecting on the development of waste management policies, this chapter provides a foundation for understanding extended producer responsibility as a policy tool. The final section connects this tool, and waste/ing in general, to power and governance.

Chapter four first identifies and then attempts to avoid the micro/macro dichotomy of waste analysis literature by developing a meso framework for waste analysis. This framework identifies the relationship between the micro and the macro through an understanding of the circuits of productive capital. Waste, which is commonly described as a problem of consumption, now sits situated more appropriately in this chapter as a problem of production. Therefore, the production process provides a foundation for the understanding of the necessary role of waste in capitalism. This chapter provides a basis analyzing the 2000/53/EC ELV Directive in chapter five.

Using meso-level analysis and the understanding of the necessary role of waste developed in the previous chapters, chapter five applies the constructed framework to the case study of the implementation of the 2000/53/EC ELV Directive in Germany. The

chapter justifies the methodology of this dissertation, namely, the single case study and elite interview research. The results of interviews conducted with automakers in Germany in 2010 provide embedded units of analysis to understand the specific case of study, implementation of the directive in Germany. Finally, this chapter interprets the research within the meso-level framework developed in the previous chapter.

With the limitations of the 2000/53/EC ELV Directive openly identified, chapter six attempts to create a space for future research by identifying how and why design modification in production potentially could take place to improve waste management. This insight is based on the previous chapter, which shows how in the instance of the 2000/53/EC ELV Directive why the state and capital have worked together to subvert changes in the production process for vehicle manufacturing. This chapter then considers the potential motivations for promoting change through more stringently designed government regulation, internal corporate needs, and ownership structures.

The final chapter summarizes the project and emphasizes the contribution this dissertation makes to the existing literature on waste/ing in both theory and policy analysis in several important ways. First, it contributes to the body of theoretical consumption literature by further exploring notions of waste/ing. It also assesses and expands the quite limited existing interdisciplinary body of disposal/waste literature (Hetherington, 2004; Riley, 2008; Scanlan, 2005). Second, it explores methods of disposal in an interdisciplinary context (political, economic, and social) leading to the examination of public policy instruments. This is a fairly neglected topic within both policy and theoretical literature. The exploration of waste/ing in this context can be used to inform other government policies of extended producer responsibility as well as

product stewardship and integrated product policies as related policy tools used by member states of the European Union as well as other countries. Finally, as the automobile continues to maintain its significant place in both the individual psyche and transport infrastructure of most nations, a coming shift to power automobiles with alternative fuels may quickly make millions of vehicles obsolete in the near future. This fact coupled with the exponentially increasing use of cars in developing countries such as India and China has tremendous implications for waste policies associated specifically with this physical object.

Further, *wastes* are tangible phenomena and processes all people encounter on a daily basis. By making visible the regimes of power and networks in which waste is produced, it is possible to explore how the economic, political, and social system produce, define, and characterize “waste” and “wasting” as problems tied to environmental degradation. This research explores how the “problem” of waste therefore cannot simply be found in techno-fixes or some increase in efficiency at production and recycling. It requires rethinking the system of economy and production, and a reimagining of waste as a “problem.” The phenomena tied to of waste within these categories create a microcosm of market and state failure to examine the larger issues of the role of the production (economically, politically, and socially) in environmental degradation. As a topic that people are emotionally concerned about in everyday life, it is likely that examining the “why” of waste is critical. In a way, this study asks how this materiality is conceptualized as waste and non-waste to better understand “how” these environmental concerns/problems can be addressed, reconceptualized, and examined.

Chapter Two

WASTE AND THEORY: THEORIES AND/OF WASTE/ING

2.0. INTRODUCTION

At some point in time most objects reach a period where they are no longer desired by their current owner. It is here that action is taken on the individual level to “dispose” of the object as waste. This chapter provides a review of social theory literature pertaining to waste and disposal. It considers what happens when desire for the object no longer exists. The discussion is divided into three sections: waste in the concrete and abstract, waste and desire, and waste and the economy. Each section concludes with the tying of relations of waste/ing to the object of the automobile. This chapter provides a foundation for modern notions of the interactions among waste/ing and the social, political, and economic.

I begin by attempting to define, describe, and deconstruct waste/ing to provide an introductory point to frame this research. The first section of this chapter reviews the waste literature broadly identifying the role of waste/ing as both an object and idea, and in this a segment of a process in the material manifestation of social relations. This section examines how waste is used as a tool and a theoretical construct in a variety of social science disciplinary contexts.

Early critical literature discusses waste implicitly as the result of consumption. Problems of “waste” are therefore problems of consumption linked to desire. In the second section I examine this literature, predominately rooted in the work of the

Frankfurt School (but also addressing important notions established before the founding of the school), focusing on the impact of the manufacturing of desires and the influence of changing patterns of consumption as evidenced through objects and systems. While waste/ing is not an explicitly dominant theme in most of this literature I will pull from this body of work the roots of current disposal discourse linked to concepts of desire. In the post-WWII era new notions of needs and consumption were formulated, and modernity provides the foundation for conceptualizing waste today within the Western context. As a new technology of consumption available to the masses at this time due to changes in the process of production, the role of the automobile as a symbol and element of modernity is described.

In the third section I explore the relationship between the discourse of waste and political responses. As waste is socially defined, this definition may occur or interact with political framing. I use the example of the crisis of waste discourse is used to illustrate this phenomenon.

The final section addresses the essential role the creation of waste plays within modern capitalist economic structures. I examine waste as part and parcel as excess and necessity rather than creating boundaries and limits. The discussion utilizes economic arguments regarding the creation of waste within the confines of capitalism drawing on theories of production, property rights, and externalities. This section ends by identifying the role of the automobile as an object. Its positioning within the global economy grounds it in the context of economic relations, further highlighting the importance of the auto as an object of research.

The discussion of waste/ing in this dissertation is interdisciplinary both by necessity and by design. An interdisciplinary approach is a necessity because theories and theoretical discussions of waste and disposal, both generally and more specifically within the context of an object such as the automobile, are quite limited across the disciplines. While there have been attempts to “make visible” (Thompson, 1979) the act of disposal, conceptualization remains incomplete, and without a defined body of literature or even a framework for intellectual examination (Riley, 2008, p. 14; Scanlan, 2005). Most of the existing literature focuses on the social or cultural components of the consumption/disposal of consumer products, not as garbage, but as a way to understand modern life (Scanlan, 2005). The discussion to follow identifies and utilizes what is written within the disciplines of political science, public policy, economics, anthropology, sociology, philosophy, cultural studies and history as a way to bring together fragments from each to create a more complete understanding of the practices and processes of waste/ing.

Waste, however, is also discussed in an interdisciplinary context in this dissertation by design. It is only through the exploration of waste and its interactions within economics, politics, and society that we can fully understand this action, creation, and notion of waste/ing within the context of specific objects such as the automobile. These categories cannot be taken individually. This chapter is an attempt to bring together a broad range of ideas from many streams of literature to begin to formulate a holistic conceptualization of waste/ing.

2.1. THE MATERIALITY OF WASTE

Although we tend to associate waste with modern product *disposability* (such as single-use water bottles or disposable diapers), the creation of waste is timeless: waste is created and has been created by all societies. Archeologists use objects found in the garbage dumps of previous civilizations to construct historical narratives. It is the garbage piles that frequently provide the most beneficial and consolidated form of physical record of a community (Rathje & Murphy, 2001). Through the discards of societies, attempts are made to determine what was produced, valued, worshiped, and circulated, illustrating social, economic, and power relations. Underutilized by many disciplines, the examination of the objects of waste can, and for reasons argued throughout this dissertation, should inform the study of social systems.

Physical records are important for understanding abstract notions of disposal. Although we speak of throwing garbage, trash, or other discards “away,” *away* simply does not exist. Rathje and Murphy (2001) provide a visible reminder that modern materials and products do not “go away.” In the book *Rubbish! The Archaeology of Garbage* Rathje and Murphy describe the work of the University of Arizona’s “Garbage Project.” Self-proclaimed anthropological/archeological “garbologists,” Rathje, Murphy, and countless graduate and undergraduate students excavate landfills to study citizen purchasing, consumption, and disposal behavior.

This study is possible because objects of waste do not easily disappear. It is a common myth that garbage “breaks down” in a landfill, returning to an organic form of soil. The lack of moisture and oxygen in most landfills prevents the decay of organic material making it possible, for example, to identify cuts of meat and banana peels from

the 1920s and even read newspapers from the same time period. By linking this information with urban records, members of the “Garbage Project” are able to determine within a small radius the neighborhood (and related demographics) from which garbage was produced and subsequently collected and disposed. The Garbage Project therefore uses found objects (literally trash) to construct ideas of value and waste from communities across the United States.

Waste is often visible. It is on streets, in home waste containers, accumulating in one’s car, and is segregated in buildings. It is in a trashcan under an office desk and collected by flight attendants at the end of a journey. It may smell, splash, spill, and/or seep. Waste is concrete and material, but also circulates within “themes of movement, transformation, incompleteness, and return” that cannot be explicated from social interactions (Hetherington, 2004, p. 157). These interactions with and of waste/ing, it is important to note, are never activities of finality. The production, consumption, and disposal of materials such as automobiles are cyclic and intertwining, as a constant and yet abstract processes. These themes can (and I argue should) be used to explore political, economic, and social relations in the concrete manifestation (trash) of abstract (that which is no longer valued) concepts.

2.1.1. The anthropological roots of waste/ing

“Garbage” is everywhere. In most actions of ordinary life we implicitly or explicitly separate that which contains worth from that which is worthless – garbage being what is “refus-ed” (Scanlan, 2005, p. 14). In the social sciences, the discipline credited with the earliest recognition of the role of waste within society in the concrete

and abstract is anthropology. Waste here has been broadly defined, rooted in ideas of “dirt,” “dirty,” and “taboo.”

In *The Gift: The Form and Reason for Exchange in Archaic Societies* Marcel Mauss describe a form of disposal through the discussion of social relations with the concept of the gift and potlatch (Hubert & Mauss, 1964; Mauss & Halls, 1990). The giving of an object to another person implies certain social relations – specifically reciprocal exchange. Disposal in this context is necessary for participation within societal ranking processes, community ordering, and generating communal stability. Disposal is thus a stage in a process of events that may include the discarding of people (sacrifice), animals, or objects. This stage is not final in that it only describes a portion of the social relations surrounding the process of *gifting*. Gifting as a form of exchange is an unending, cyclical process that creates a social bond not only between the giver and receiver but also between the giver and the object of gift (that which will be disposed). This blurring and bonding of social relations is an initial insight into the complexity of relations of disposal in social interactions.

In a second important text in anthropological discussions of waste/ing, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo*, Mary Douglas also describes disposal as a method of social ordering, “where there is dirt there is a system,” implying that the decision between what is dirt and what is not is a form of social ordering (1984, p. 44). Douglas frames that which is no longer desired (dirt) as “matter out of place” (abstracting pathogenicity and hygiene) (1984, p. 45). This is a frequently used definition for trash in the current discard studies literature. Douglas negates that which is “in place” from that which is not creating a category of *this* or *that*, with an exclusion of *that*. It is

important to note that these categories are socially constructed and Douglas emphasize that a result of this social construction is that what waste *is* therefore is determined by the person who is doing the defining.

Douglas's conception of dirt and social ordering has received considerable critique. Although it serves as one of the earliest attempts to describe that which is no longer desired, her classification is quite limited as a conceptual framework. Douglas's labeling of exclusion defines trash, waste, and/or disposal of material as the end point of a linear practice rather than a single point in time of a cyclic, infinite process. Douglas's assumption is that once a material is designated through exclusion as dirt (waste), the designation will remain. This definition is misleading because unlike what Douglas proposes, "dirt" or pollution/garbage never truly "goes away" and therefore can never truly be excluded (Hetherington, 2004). The designation of exclusion by one person does not result in the banishment of a material to a hole or pit, never to be seen again. Material never "goes away" if banished to a landfill. Rather, waste retains its materiality, in a holding position, waiting to found by archeologists, excavated for economic value, monitored and managed to prevent further environmental degradation and the like. Waste, however, is not always moved to a landfill. It can also circulate within society as materials are reused as well as within the production process in a circuit of productive capital as materials no longer desired are recycled into new products, serving as a feedstock for production.⁶

2.1.2. Waste as social ordering

⁶ How materials are recycled in the circuits of productive capital is described at length in chapter four.

Mauss⁷ and Douglas provide the foundation for a frequently used conceptualization of waste within the academic literature: waste as a distinction between order and disorder. This definition is the basis for Scanlan's (2005) interdisciplinary exploration of trash in *On Garbage*. He defines waste not only as tangible material thrown away in trashcans and discarded in rubbish pits but also as the discard of intangible ideas and notions, emphasize for example, within social theory and philosophy, that most theoretical proposals are eventually discarded (as garbage) once out of fashion. Scanlan (2005, p. 61) stresses "the history of modern philosophy is a history of garbage" in that it is a record of ordering, culling, and disposing through the "territory of reason" that provides the foundation (or perhaps "cannon") for the thinking and rethinking of conceptual explorations and theoretical developments over periods of time.

In addition to expanding objects of study beyond simply the material, social ordering literature such as Scanlan's also creates a categorization process that moves beyond a purely binary distinction (this or that – order or disorder) as is found with Douglas's definition. Waste/ing becomes more complex – distinctions are multiple, overlapping, and ordinal if applied on a liner scale. In this literature garbage blurs the line of inside and outside, public and private (Scanlan, 2005). For example while the disposal of household waste is viewed as an immensely private practice, undertaken with anonymity (the placement of material in an opaque trash bag). It is not. Garbage on the street in the United States, for example, is considered public property:

Of all the commodities of industrial societies, wastes are certainly the most peculiar insofar as they are the only profit-generating commodities that no one

⁷ Henri Hubert to an extent may also be credited for the development of this concept. Hubert and Mauss together authored *Sacrifice: Its Nature and Functions*, a work that serves as a precursor to the concept of "the gift" as developed by Mauss in later writing.

seeks to possess: when a journalist is caught rooting through the bin-bags of celebrities s/he is charged, not with theft of property, but with trespass or invasion of privacy. (O'Brien, 1999, p. 285)⁸

This blurring of distinction, location, and possession, adds a spatial and legal component to ordering. It is in this ordering that the ability to forget also exists:

We remain blind to the realities of waste because modern society has almost perfected the means to forget – not only because we are largely ignorant of the productive tasks undertaken by others but because within this individuated existence we may easily resort to any of a bewildering array of alternatives to ‘reality.’ (Scanlan, 2005, p. 129)

Perhaps waste should be thought of then as described here by Scanlan in the category of death *and* taxes – it never truly disappears, it never truly goes away (as is evidenced so eloquently by Klíma’s street sweeper in his novel *Love and Garbage*) – it is indestructible and something that we would *rather* forget when possible.

2.1.3. Ordering waste as non-terminal and socially defined

The distinction between order and disorder and waste as an ending point in early anthropological literature also provides the foundation for more recent literature identifying modern society through wasting practices as a “throwaway society.” “Throwaway society” is a term used to signify changing patterns of production, consumption, and disposal as perceived on both the individual and societal level and as quantified through various forms of measures in the post-World War II era of the 1950s and 1960s (Cooper, 2009; Strasser, 1999). Perceived increases in the volume of waste disposed coupled with very visible representations of disposability such as single use plastic packaging are commonly identified to denote changes in consumer relationships

⁸ In the United States the court case *California vs. Greenwood* ruled that the “borders of the household do not encompass the contents of the trashcan” (Strasser, 1999, p. 7).

with products (Alter, 1993; Robinson, 1990; Strasser, 1999). A combination of industrial efficiency activities developed in wartime manufacturing, the growth of middleclass prosperity resulting in an increase in disposable income, and production techniques such as planned obsolescence and advertising campaigns to encourage consumer purchasing in saturated markets are factors associated with the development of the “throwaway” society (Cooper, 2009; Galbraith, 1998; Packard, 1960).

This idea of a throwaway society, however, is limited in the same way as Douglas’s argument in that waste is considered an end point. Literature describing the throwaway society fails to recognize that one persons’ designation of an object as waste does not destine that product to the landfill, banished forever. Rather, waste/ing is much more complex, consisting not only of disposal but of “simultaneous practices of saving and wasting” (Gregson, Metcalfe, & Crewe, 2007, p. 682). For example Gregson (2007) documents how the process of trash entering the waste stream is much more complicated and involved than often initially considered. Substantial attempts are made to avoid disposal (of materials as garbage) when possible and instead move material into gray areas (storage) or donate or give away (reuse) this material:

The throwaway society thesis, however, confuses act and process. It conflates the act of discarding with what discarding achieves, socially, and culturally. Further, it refuses to acknowledge that discarding (the act) is a spatially, socially and economically differentiated process, one that can be anticipated to connect in myriad ways to the making of social relations, identities, and distinction. Moreover, to confuse act with process matters profoundly, particularly given that discarding, and particularly discarding as waste, is a charged act, increasingly one of the primary means through which people articulate both an ethics of care and moralities of practice, often drawing on the notion of a throwaway society in the process. (Gregson et al., 2007, p. 683)

Cooper (2009), along this same line argues that rather than a focus on a changing *volume* of waste disposal (i.e. the movement towards a throwaway society) what should be of

focus is changing *patterns* of waste disposal, specifically increasing visibility of that which is disposed such as food and product packaging. The increasing visibility of these materials illustrates the “social and economic changes in the changing material character of waste” (Cooper, 2009, p. 56). Cooper (2005) also acknowledges a lack of quantifiable evidence available to make definitive, or at least informed claims, of increasing levels of disposal over time. Rather most information is based on anecdotal references. Very little information was recorded of the volume of waste disposed of in individual landfills, for example, before the enactment of government regulations restricting specific forms of disposal practices. Waste and history of this wasting thus, it can be argued, is a complex process; it is more than simply a linear dynamic.

Waste therefore is a socially defined category that can provide insights into the ordering of society. As a socially defined category, what is defined as waste varies from person to person and time period to time period. Waste and the process of wasting, however, has always existed. As evidenced by the inability of objects to simply “go away” this materiality has increasing importance in the understanding of political and economic relations. In the next section and further in chapter three this materiality is specifically tied to environmental and economic consequences.

2.2. WASTES, NEEDS, AND DESIRE

“If one accepts the consumption of rubbish as a part of consumption – that is, if one makes rubbish overt rather than covert – then the compost heap becomes a powerful status symbol”

(Thompson, 1979, p. 117)

2.2.1. Introduction

This chapter began by asserting the materiality of waste. Waste is a tangible material with real implications for social, political, and economic relations. I examine

next how waste is perceived in the literature through an understanding of socially constructed norms and desires. This is important because modern critiques of consumption are rooted in this discussion, providing a framing for how waste literature often (mis)identifies waste as a problem of consumption. This framing has real implications in the identification of “problems” and therefore “solutions” of and for waste. I begin this section with the grounding of the consumption critique in the work of the Frankfurt School, specifically that of Herbert Marcuse. I then move forward in time to the role of consumption and consumerism described by the later social theory critiques of modernity and post-modernism. This section examines both of these streams of literature, their relationship to theories of need and desire formation, and the relationship of this to acts and concepts of waste/ing. This section concludes by identifying how these relations are illustrated through a material object: the automobile.

Thorstein Veblen (1998) provides one of the earliest cited critique of notions of want and desire in social and economic positioning. In *The Theory of the Leisure Class* Veblen draws connections between identity and waste/ing to categorizations of items we no longer want through class distinction and socioeconomic status. Ownership of materials is symbolic and serves as a visual display of wealth (Frow, 2003). Consumption is a “social value” and in this, as with Douglas (1984), a “reproduction of culture” (J. B. Schor, 2007, p. 18). Ownership is tied to honor, envy, distinction or discrimination rather than consumption. This use therefore is a form of social ordering identifying how the early anthropological literature is applicable in modernity. Consumption and hierarchy

are linked to this now almost commonplace/”common knowledge” idea of a display of social position (Schor, 2007).⁹

Veblen’s work provides roots for the literature explored further in this section as the formations of desires/wants is linked to identity through the act of consumption. It in consuming products we create and construct individual identities (Scanlan, 2005).

Consumption is a fundamental part of identity, a process not to be challenged (McKay, 1997). People are trained at a very early age how to consume and it is very difficult to create an identity outside of the modern marketplace (Schor, 2004). Although this early critical literature does not explicitly tie acts of disposal to identity, it serves as a starting point for further construction of identity of focus in the wake of the modern environmental movement. It can and should be argued that beyond the consumption of materials, identity is also formulated in how we manage waste (the identity of a “recycler” for example), as result of practices undertaken in disposal (White & Hyde, 2011). Discarding, like owning products, now defines one’s identity with growing implications. More recently studies are beginning to document how our intense attachment to items creates anxiety, and emotions of power and/or pleasure, in the act of disposal (Gregson et al., 2007).

2.2.2. The Frankfurt School and the opening of a space to study the manufacturing of wastes, needs, and desire

⁹ Schor (2007) interestingly, but perhaps not appropriately due to the rejection of the importance of the outward role of social positioning, terms this act “status models.” She argues that in modern literature, and even more so post-modern literature, consumption takes a turn from this idea of an outward display of social status to the focus on consumption as “individual self-creation” – a complete turn inward on consumption as a process for the self rather than for positioning within society.

Increasing visibility of consumption in the post-World War II era, especially of disposable consumer goods and the growing availability of products of mass production, inspired a critical body of literature examining the alienation of man from labor, nature, and society. Much of this literature, heavily associated with the founding critiques of Critical Theory established by the Institute for Social Research, more commonly known as the Frankfurt School, argues that alienation is caused and reinforced by the economic and social system in which the individual exists and that therefore determines one's needs (Horkheimer & Adorno, 2007; Marcuse, 1991). Thus, in modern capitalism consumption takes on a new role, one of reinforcement and strengthening of the existing economic system. Critiques of consumption, therefore, must be situated within critiques of capitalism (Kellner, 1989, p. 15).

The Frankfurt School's critique of consumption is rooted in Marx's writings on industrial societies: "with the mass of objects grows the alien powers to which man is subjected" (Scanlan, 2005).¹⁰ The production and placement in society of these objects causing alienation are a result of modern capitalism and as such in that political economy is basis of modernity (Kellner, 1989). Members of the Frankfurt School were interested in understanding Marx's ideas more broadly than were being applied at the time in the political arena by communist parties. Their work as a whole was an attempt to explain current economic arrangements with the goal of liberation, with the purpose of finding alternative societal formations.

An important text framing these ideas is Horkheimer and Adorno's pivotal work *The Dialectic of Enlightenment: Philosophical Fragments* published in 1944. This work

¹⁰ Citing page 358 in Marx, K. (1975). *Early writings*. New York: Vintage Books.

provides a foundation for a critical analysis of the failure of the age of Enlightenment to bring about human emancipation. In this it provides a foundation for critiques of modern applications of technology, bureaucracy, and rationality. In the context of consumption and desire it provides an often referenced production-side critique of “culture industries” (2007). Popular culture models the factory, reproducing this work environment in home life. The culture industry thus becomes a factory of goods for easy consumption by docile, consuming masses. Modes of the transmission of information such as film, radio, and magazines manipulate the masses into “false needs” or desires of products. These false needs (not true needs such as freedom, creativity and happiness) are satisfied through capitalism and expansion in consumption (which requires expansion in production). Consumption is easy and provides instant pleasure while at the same time causing and reinforcing alienation and further maintenance of the economic system. These concepts frame the critique the early members of the Frankfurt School in relation to consumption and therefore production. One particular theorist of the Frankfurt School, Herbert Marcuse, further speaks to this alienation and the necessary production of waste.

2.2.3. Herbert Marcuse: needs, wants, and desire

Although *One-Dimensional Man* is probably the most popularly known of Marcuse’s work, it is not necessarily most representational of the breadth and depth of his entire body of writing. This work focuses on pessimism rather than liberation and emancipation as found in his later pieces. The tone that Marcuse takes, though, is understandable. Out of the throws of World War II Marcuse finds a shocking, disturbing, and oppressive new consumer society. Drenched in money, disposability, and opulence he is appalled by his observations of the capitalist subject. In this work Marcuse provides

a critique of capitalism and the un-liberated subject that frames the modern role of waste/ing in society.

Marcuse bases his analysis of the one-dimensional society in the work of Marx.

Marx argues this in the *Grundrisse* that:

Maintaining the production system requires increased consumption. This is done by “firstly, [though] quantitative expansion of existing consumption; secondly: [through the] creation of new needs by propagating existing ones in a wide circle; [and] thirdly: [through] production of needs and the discovery of new values. (1973, p. 408)

Marcuse emphasizes the necessity of “false needs” in the maintenance of the one-dimensional man. False needs are those that according to Marcuse that “have a societal content and function which are determined by external powers over which the individual has no control” (1991, p. 7). This can be associated with conceptions of the “throwaway society” in that one fills false needs through the purchase and eventually disposal of products. These needs are necessary in capitalism because capitalist expansion requires the production and reproductions of these needs to further consumption and by default, and it is here that I extend his argument to furthering the necessity of waste production. The faster objects are designated as waste the sooner consumers can buy new objects to fill the special and emotional voids. The creation of more waste fuels the need for continued consumption for the maintenance and meeting of false needs. Capitalism requires the continued creation of waste so as to have the continued economic growth.

Marcuse thus identifies that consumption is further maintained and continued in and through capitalism as a form of social control. The “solution” of individual consumption gives the notion to the individual of having agency as a consumer, thus,

creating the appearance of freedom in consumption. This freedom is false, like the concepts of (constructed) needs, in that it is created to encourage further maintenance of the capitalist system of production and expansion. We can take from Marcuse, then, an explanation of why consumption is necessary in capitalism and why this is seen as a form of freedom rather than oppression.

2.2.4. Continuation of waste/desire conceptions: movement towards post-modernism

Beginning in the 1960s consumption is increasingly viewed as “an autonomous space in which [one] could pursue identities unencumbered by tradition, social circumstances, or societal institutions” (Holt, 2002, p. 82). Consumption becomes a way to “step outside” of convention, signifying how one is special, unique, or different. This is illustrated well in writing on cultural expression and high culture. As noted by Hetherington, more recently this focus on constructing one’s identity through consumption is its attempt to “valorize it [consumption] as a creative source of cultural or in some cases individual expression, lifestyle, and taste rather than see it as a fetishistic expression of alienation and false needs” (2004, p. 157). Viewing consumption simply as an outlet for individuality, however, conceals one’s alienation in the consumption process. Several social theorists have emphasized this well.

Writing at the time, Baudrillard (1981b), like Simmel (2004), Bataille (1988), and Hubert and Mauss (1964; 1990) previously, draws on sociological notions of class, power and exchange illustrated through Kula and Potlatch. Baudrillard identifies the importance of symbolic exchange-value over use-value illustrating how most objects play more of a role of “symbolic behavior” rather than “satisfaction of needs” (Baudrillard, 1981b, p. 33). Consumption therefore not only satisfies the needs of life but also is necessary for

socioeconomic positioning. Baudrillard illustrates how objects create “the scaffolding for a global structure of the environment” and this structure is one of a code that orders and stratifies society (Baudrillard, 1981b, p. 35). This social stratification is observable, and people attempt to position themselves within levels of society through the purchase of products. Products serve as “signs” for locating one within social position. As a result of the focus on exchange rather than use value these purchases identify your status or your “balance sheet” and reinforce social stratification through consumption (Baudrillard, 1981b, p. 50). Consumption therefore is not a democratic social function in that how you can consume depends on what you can afford to consume.¹¹ As the object becomes increasingly fetishized, society becomes further stratified into those who have and those who do not.

Because objects serve the role of a symbol rather than a function they can be interchanged. The *want* of these symbols, rather than functional products, is manufactured, according to Baudrillard, by “entrepreneurs and market analysts” (1981b, p. 82). Signs rather than commodities are consumed (Baudrillard, 1998). Needs are determined by the economic system rather than the individual, and these “needs” are maintained because they are designated and required by the economic system. Production tactics such as planned obsolescence accelerate production, consumption, and disposal through fashion; style manipulates desire.

Lefebvre (1984) also views consumption in the contexts of “signs.” Consumption is related to the signs of goods rather than to the goods themselves, resulting in some level of nominal, but lacking complete satisfaction, for the individual through

¹¹ This is important to note because we see a reemergence of why this is problematic when one is urged to “vote with ones wallet.”

consumption (Lefebvre, 1984). Lefebvre recognizes that the process of production produces both the product and the reproduction of relations in society. Needs are now manufactured based on exchange rather than use value and thus needs can be created for items and objects where none existed before (the need was previously unrealized) (2008). To Lefebvre (1984, p. 23), studying the everyday life of relations of production and exchange “exposes the possibilities of conflict between the rational and the irrational in our society and our time, thus permitting the formation of concrete problems of production.” Following along these lines this research utilizes the study of the production and consumption (and subsequent disposal) of the automobile to expose the problematic of production in modern society.

2.2.5. Wants, desire, and waste: the automobile in modernity

Marcuse, Lefebvre, and Baudrillard are important in the understanding of waste and desire because each situates consumption within the context of the economy, and specifically the relationship between capitalism and consumption. Human wants, needs and desires are not necessarily determined by preexisting preferences or “natural” tendencies. Rather, what is considered in each of these categories is socially determined. This social determination is manufactured by the economic system in which humans exist. Waste, therefore, created by consumption as required in a capitalist system, is not inherently “natural.” Waste is required to make room to fill space with new products of needs and desires. These wants and desires can be illuminated through detailed examination of objects such as the automobile and the positioning of this object within modernity.

Theorists from Lefebvre (1984) to Mumford (1934) to Baudrillard (1981a) to Galbraith (1998) have each emphasized the pivotal function that the automobile plays in modernity. The automobile maintains an unquestioned role in the organization of cities, movement of people, and operation of commerce (Mumford, 1934; Paterson, 2007). Automobility (autonomy + mobility) is “one of the principle socio-technical institutions through which modernity is organized” (Böhm, 2006, p. 1) and the auto is unchallenged in its organizational dominance (Paterson, 2007).

The automobile is both a symbol and key element (physically) of modernity. It is fundamental to the shaping of modern life both culturally and materially. Post-WWII consumerism and consumption literature frequently use the object of the automobile in descriptions of modernity. The automobile embodies notions of speed, individuality, freedom, and mobility. No longer are people bound to the schedules of trains when traveling, with the auto one can decide when to leave, how fast to travel, and the exact route of the trip. Lefebvre identifies the car as a “leading object,” central to culture in modern society. It is functional but also a status symbol, “it stands for comfort, power, authority, and speed, it is consumed as sign” (Lefebvre, 1984, p. 102). In this the car is a commodity that illustrates wants, needs, and desires manifest in modern capitalism (Dant & Martin, 2001; W. Sachs, 1992; Thoms, Holden, & Claydon, 1998).

Physically the automobile as an object plays an unquestioned role in the organization of cities, space, and commerce (Mumford, 1934; Paterson, 2007). Automobiles provide the “freedom” necessary to move out of urban centers and into the suburbs (Hanson & Giuliano, 2004; Mumford, 1934; Szasz, 2007). City flight and urban decay, thus, are defining concepts within modern urban infrastructure management

(Hanson & Giuliano, 2004; Moore, Thorsnes, & Appleyard, 2007). Automobiles also provide the “freedom” necessary to consume (literally) through facilitating the transport of shoppers to a number of geographically dispersed shopping areas. Once purchases are made shoppers are no longer limited to buying what they can carry, but rather what they fit in the car (Paterson, 2007).

The automobile is also implicated in the development of new and innovative practices executed by producers to increase levels of product consumption. Alfred P. Sloan, a top official of General Motors for more than three decades, along with Harley Earle are credited with developing the concept of “Sloanism” or the aesthetic change in body design of an automobile that allows for the determination of the year in which the vehicle was created (Miller, 2001). Vance Packard (1960) details this change in production, and describing how the General Motor’s automobile was one of the earliest products to follow the trend of women’s fashion in creating a “yearly update.” “Fins” and stylized break lights were augmented on (eventually) a yearly basis, not for functionality but for style, with the specific purpose of “dating” a product. Consumers driving new cars became easily identified by body style, and the style of one’s automobile became a sign for sex and status in a form of “unconscious discourse” (Baudrillard, 1981a, p. 174). The car is used to indicate one’s position in society, creating hierarchies of “size, power and cost” and serving as “a status symbol, it stands for comfort, power, authority, and speed, it is consumed as a sign” (Lefebvre, 1984, p. 101).

These theoretical implications, strongly reflected in the automobile because of its use in the literature, can be applied to manufactured products generally. Although not all products share the same notions of freedom, individuality, and mobility as the automobile

these themes of modernity are embodied to some degree in all products, and especially those commonly associated with disposability. Exploring the automobile for this dissertation allows for the focus of an object that is a “key axes in the broader struggle over what should be consumed, when, by whom, how much, and where” (Luke, 2001, p. 312).

2.3. WASTE AND THE POLITICAL

2.3.1. Waste as socially defined: implications for the political

As previously identified, “rubbish” or what is considered waste “is socially defined” and thus how we define what is trash or of value is social rather than physical (Thompson, 1979, p. 11). In this, individuals label the designation of objects as waste, socially. In this, though, it is important to note that individuals have very little agency regarding when objects become waste. Rather it is important to note that the designation of an object, its labeling as waste, is “neither arbitrary, nor natural, nor homeostatic” but rather “the outcome of social forces mediated by knowledge, and as such may be seen as the bending of reality to fit the dominant social theory” (Thompson, 1979, p. 102).

How waste is defined at any given time depends on the context in which the discussion is framed. Politically attempts are made to create a standardized definition of waste so as to allow for an ordered system of waste governance (Davies, 2008). These political definitions of waste are technical and designed to be used by those who coordinate its management, whether this is in the context of engineering solutions or political remedies. As emphasized by O’Brien (1999):

Contrary to popular opinion, the alchemists of the rubbish society are not primarily the scientists and technicians whose researches and inventions provide the industrial machinery for waste's rehabilitation. The alchemists of the rubbish society are town planners, environmental health departments, European

Commissioners, Government Ministers and the Mafia: they are organized through bureaucratic and trading, rather than scholarly and scientific, organizations. (p. 281)

The political definition of waste can limit waste management solutions by framing the “problem” within the context of a technical issue to be addressed at the point of disposal of products. This framing limits the defining of waste as a problem of disposal, rather than seeing the problem and potential “solutions” as problems of production of material that must eventually be disposed. How this definition is created, though, is a socially determined process as evidenced by the example of the crisis of waste discourse in the United States.

2.3.2. Implications of the defining of waste: the example of the US waste “crisis”

The United States is one of the first countries to define waste for political purposes. The defining of waste by the government provides a useful illustration of the interplay among the political, economic, and social facets of waste/ing. In 1965 the United States Congress passed the Solid Waste Disposal Act, the first such federal act regulating household waste and requiring the establishment of minimum federal guidelines for the disposal of waste. This act was the first national attempt to address the hazards of waste disposal specifically through the initiation of research and surveys to determine more environmentally friendly management methods (Wolf, 1979). In 1976 Congress passed the Resources Conservation and Recovery Act (RCRA) as an amendment to the 1965 Solid Waste Disposal Act. Although predominately addressing hazardous waste, this law includes two important provisions effecting the management of municipal solid waste. The first, “Subtitle D,” gives state governments the responsibility of monitoring and regulating municipal landfills to meet strict new environmental

guidelines. The second directs the Environmental Protection Agency to create federal procurement guidelines encouraging the purchase of materials containing recycled content to promote markets for these types of products.

The defining of waste in the political has enormous implications for not only the public management of waste, but also for the economy. The passage of the 1976 amendments to RCRA are recognized for two major effects: 1) initiating the closure of numerous small landfills unable to meet stricter environmental standards and 2) increasing the difficulty in identifying appropriate locations for new landfills due to structural requirements to of new landfill facilities (Tammemagi, 1999). As a result the landscape of waste management changed dramatically in the United States. In reaction to these changes I label a third effect of the RCRA amendments: the creation of the discourse of a “crisis of waste” in the 1980s.

It is in this period that “crisis” became a well-used term in public and government discourse, associated fully with the management (or lack of management) of waste. The ill-fated voyage of the *Mobro 4000*, the first of two infamous *gar*-barges symbolizes and institutionalizes this call of crisis (Tammemagi, 1999). The *Mobro 4000* captivated the public’s attention in 1987 as it carried more than 3,000 tons of municipal solid waste generated in New York up and down the eastern seaboard. Rejected due to unforeseen negative publicity and resulting public concern at its scheduled port of disposal in North Carolina, the barge traveled more than 6,000 miles in search of a place to offload its (eventually stinking, well photographed) cargo. Unable to find a place for disposal the barge finally returned to New York after traveling as far as Belize. The cargo was incinerated in Brooklyn, the location where the waste was originally generated.

The media attention focused on this barge, and another, the Khian Sea containing ash from a Philadelphia incinerator, are credited with initiating the discourse of the “waste crisis” (Hoffman & Ocasio, 2001; Pellow, 2004). This crisis discourse, however, was misleading. No crisis of *space* (or a lack of space) for material disposal, as was identified in the discourse as the “crisis” by the pair of gar-barges, existed at the time or exists today. What was happening was the closure of 3,000 small landfills (as required by the RCRA amendments) by the Environmental Protection Agency that did not meet strict newly developed standards for waste disposal regulations. The closing of these dumps rearranged waste management practices for many communities, consolidating disposal in larger, and often less conveniently located for public access, landfills. This mixed with the anti-toxic rhetoric emerging in the late 1970s linked with awareness of environmental disasters such as the Love Canal (New York), Times Beach (Missouri), Bhopal (India), and Chernobyl (Ukraine) leading to citizen outrage over the siting of new (compliant) landfills in communities culminating in the construction of the narrative of “crisis” (Weinberg, Pellow, & Schnaiberg, 2000).

While this dissertation uses a European case study specifically, the example of the creation of the crisis of waste discourse in the United States supports important waste and recycling themes in the waste literature. As socially defined, the management of waste is shaped by government action, and this action is shaped by a variety of social, political, and economic factors.

2.4. WASTE AND THE ECONOMY/PRODUCTION

Is not the fact that the glass packaging can be thrown away the mark of the golden age?
(Baudrillard, 1998, p. 45)

Through the lens of the economy waste is viewed theoretically and concretely as inefficiency, an externality, or more recently, a feedstock for further production. How waste is characterized, and the role it plays within capitalism, is fundamental to the understanding of changing notions of value and what is valued and therefore what is waste/ing/ed. Waste and the economy serve as an important starting point for discussions of the physical circulation of material as well as for proposing alternatives for the positioning of waste systemically.

Although current conceptualizations of discards and disposability are greatly shaped by economic developments in the post-war era, modern notions of waste are rooted in changes sparked by industrialization. One of the earliest social theorists to upon this issue is Walter Benjamin in his work *Arcades Project*⁷⁶⁶⁶⁶⁶. Benjamin “took seriously the debris of mass culture as the source of philosophical truth” (Buck-Morss & Benjamin, 1989, p. ix). In the Paris arcades, the “original temple of consumer capitalism” he finds the embodiment of modernity and progress (flashy, large) made tangible through a physical structure (Buck-Morss & Benjamin, 1989, p. 83). But it is in the small discards, the trash and garbage that Benjamin finds “unprecedented material destruction” (Buck-Morss & Benjamin, 1989, p. 93). Buck-Morris (1989, p. 218)

describes Benjamin’s exercise in that he:

broke with the philosophical canon by searching for truth in the ‘garbage heap’ of modern history, the ‘rags, the trash’ the ruins of commodity production, that were thoroughly tainted with the philosophically debased qualities of empirical specificity, shifting meanings, and above all transience.

Benjamin’s work emphasizes the interconnection between philosophy/social theory and the economic mode of capitalism.

Building upon this connection made by Benjamin, this section on the economy and waste begins with an outline of the economic importance of waste since the Second World War describing how today's waste discussion is framed by post-World War II economic expansion. Next I describe waste within the confines and constraints of capitalism exploring specifically both the production and consumption of materials. Environmental literature predominately describes the global economy and its state/geographic divisions as operating within an idea or reality of scarcity. I challenge this frame by considering the literature of Bataille (1988), Baudrillard (1998), and Galbraith (1998) who each identify the economy as one of excess. Beyond notions of excess or scarcity, I identify property rights and externalities and their role in the identification and, if applicable, removal of "waste" from the economic system. Finally the automobile is discussed in its relation to the economy as an object of production, consumption and disposal.

2.4.1. Waste and Capitalism

As Strasser (1999, p. 18) notes, "the history of trash... offers fundamental insights about the history of industrialized society and its consumer culture." Although critiques of the consumer culture and consumption existed before the post-WWII era (see for example Veblen), the development of a substantial critical body of literature began with the work of the Frankfurt School as introduced in the second section of this chapter. This literature is a reaction to changing conditions in the industrial, economic, social, and political environment.

It is in the post-WWII era that the first links are made between waste and consumption, both conspicuous and non-conspicuous (Cooper, 2009). This is a rather

shallow association, though, of the operation of waste within the economy.

Problematizing waste within consumption fails to account for the formation and circulation of waste within the economic system. Consumption is only the process following that of *production*. To understand the relationship between consumption and production, and the importance of conceiving of waste as caused by the system of production, one must seek a fuller understanding of the economic system of capitalism. This is illustrated well through the work of Karl Marx.

Marx begins *Das Kapital* with the concept of the exchange of the commodity: a product to “satisfy human wants” (Marx & Engels, 1978, p. 303). As referenced in the previous section, commodities have both use-value (utility through consumption) and exchange-value (the value of an object as designated through exchange). The creation of a commodity requires two components: labor and natural resources. Marx acknowledges the role of nature and natural resources in the production process in that nature is processed into a commodity via labor. He recognizes this importance by using William Petty’s conception of production that “labour is its father and the earth its mother” (Marx & Engels, 1978, p. 309). This recognition opens the door to the conceptualization (or lack thereof) of environmental degradation as concealed within commodities in the same way that exchange of commodities conceals labor.

In this when one observes a product, one “sees” use-value; i.e. how the object will satisfy needs. Thus, objects, the result of the transformation of natural elements into useful commodities through the process of labor, are viewed by the consumer in terms of utility and use. Or, more specifically, how a product will meet one’s needs. One does not conceptualize the product in terms of what Marx would consider its “true” value- the sum

of the labor required for production, this is concealed. Commodity fetishism describes this detachment of the user from all that encompasses the production of a product. This detachment is rooted to the division of labor in that the product is manufactured “out of sight” from the consumer, it is concealed. The consumer therefore lacks intimate knowledge of the production process and only views the product in terms of exchange value based on tradability. Division of labor conceals the social aspect of production in embodied accumulated labor.

The embodied accumulated labor is detached from the product in the same way that the embodied environmental degradation created through the manufacturing and future disposal of the product is detached from the consumer. The consumer first comes into contact with a particular product or the result of the production process only at the time of trade (for example, when one goes to Target to buy a blender). The consumer does not “see” the labor that creates the product; she in fact has no intimate knowledge of how the product is made. Therefore she does not see the embedded labor process. She does not see/realize all that encompasses product manufacture from mining of the metal to assembly line production to the quality control inspection of the product by the factory worker. In addition to the detachment from labor the consumer also does not see the embedded environmental impact of the production of the product. She does not see the toxic byproducts from the plastic manufacturing, the polluted water created during the metal mining process, the carbon dioxide emissions spouting from the cargo ship carrying the product across the ocean. To the consumer, her thoughts are (probably) not concerned with the embodied pollution or labor associated with the production of the

product. She is concerned with the value of the product based on exchange. She is concerned with individual product use.

Further in this argument for/of concealment, Simmel (2004) argues that the relationship between want/desire and social positioning is not innate. He identifies the roots of a changing in the relationship between humans and objects in his work *The Philosophy of Money*. To Simmel (2004) subjectivity and social relations are formed through consumption and subject-object relationships. Valuation of an object increases depending on one's distance from the object, the need for the object (especially immediate needs such as a starving person and the need for bread), and the emotions the object can illicit. Simmel views value in terms of a more "unified" "plurality" which includes both mental and physical labor factors including "specific historical and technical conditions" that may or may not be fully understood (Simmel, 2004, pp. 411, 428, 95). In exchanging money, rather than bartering, the producer and consumer are not forced to meet or interact and therefore the producer is not valued within the product.

Continuing upon this argument, separation from production through the division of labor allows consumers to ignore the embodied degradation they purchase. This ignorance results in detrimental environmental damage. In terms of global warming, the result is potentially irreversible damage that will fundamentally change human interactions with both each other and the planet. One would think that potential catastrophe would change human habits. But this change is difficult, if not impossible within the current system for the same reason that one does not conceptualize embodied labor.

2.4.2. Waste and scarcity, excess, and necessity: alternative views of consumption?

The 1960s ushered in the modern era of environmentalism. Two works of particular importance framed the emerging alarmist discourse. Paul and Anne Ehrlich sparked fears over the exponentially growing population rate in the *Population Bomb* while The Club of Rome's MIT created publication *The Limits to Growth* emphasizes the disastrous effects of increasing population growth coupled with the limitation of planetary finite resources. The first makes famous the $I = PCT$ equation (environmental impact = population size x per capita consumption x environmental impact of technology). The second uses new technology of the time, computer modeling, to predict future growth in consumption assuming finite global resources. Both arguments are similar to those of Thomas Malthus's fears of population growth in *An Essay on the Principles of Population* predicting horrible global consequences. These two texts, popularly read at the time, helped to frame the discourse of the modern environmental crisis/movement as one of over use of scarce resources (in the form of increased consumption) magnified by a growing global population.

Bataille (1988) has an alternative view of resource use within the economy. In his conception of the economic system (or general economy) he finds excess, luxury, and the necessity of using resources as fundamental to the system. The general economy depends on the "circulation of energy on the earth" (Bataille, 1988, p. 19). Within this circulation living organisms receive more/excess energy than they actually consume. The availability of excess energy is required for growth and reproduction of individuals and societies. This energy, Bataille argues, "must be spent, willingly or not, gloriously or catastrophically" (Bataille, 1988, p. 21). Humans, at the top of the pyramid, have the most excess energy. This excess occurs within an economy that is both complicated and

interconnected. Bataille has an ecological view of the economic system in that he considers solar energy as the source of life, “giving without receiving” and the biosphere as the only factor that truly limits the economy (Bataille, 1988, p. 28–9).

Although excesses within this system must be spent, it must not necessarily be spent on luxuries. Bataille posits that a morally based system of exchange, transferring excess from wealthy to poor areas (intra or interstate), can exist. This transfer should be thought of as transfers of excess as a strategy for poverty alleviation as opposed to transfers of money simply to raise the standard of living. The current focus on the standard of living is problematic and hides the “truth” of the system – excess. The accursed share to which Bataille (1988) refers (the title of his work) is the excess energy that cannot be controlled within the system must be spent. There is no scarcity of this excess energy.

Bataille provides a critique of capitalism, especially in the inequity it creates and its “unreserved surrender to things needless of consequences and seeing nothing beyond them” (1988, p. 136). Capitalism, as noted by Bataille, reduces the human to a thing or commodity, to something that can be used and then disposed. Bataille challenges the idea of the economy as one of scarcity and “closed economy” because it does not take into account aspects such as waste (1985). A closed economy assumes that waste does not exist, products at all points are simply throughputs. This is problematic in that it fails to emphasize the role of waste/ing resources as well as the materiality of created products of different forms that may not yet (or ever) have a useful value.

Baudrillard (1998, p. 43), along this same line, asserts that “all societies have always wasted, squandered, expended, and consumed beyond what is strictly necessary

for the reason that it is in the consumption of surplus, of a superfluity that the individual – and society – feel not merely that they exist, but that they feel alive.” Waste therefore can also here, as with Bataille, be thought of as a “positive function” – the “site of production of values, differences, and meanings both on the individual and the social level” that cannot or should not be eliminated (Baudrillard, 1998, pp. 43, 45). Where as waste plays the role of festival, ritual, and symbol in primitive society, in modern life it becomes a bureaucratic necessity. Drawing back upon Bataille, Baudrillard identifies how waste “orients the whole system” by “signifying abundance” – waste is equal to wealth as well as modernity (1998).

In *The Affluent Society*, published in 1958, John Kenneth Galbraith makes similar arguments of an economy of excess or affluence rather than scarcity. Galbraith critiques the United States’ obsession with production as a measure of success and source of economic stability. The focus on production and GDP is rooted in economic theories developed during times of poverty and *scarcity*. Although it remains in place, this basis is no longer necessary or appropriate today. Galbraith begins his work by introducing the role of economic history in producing the roots of conventional wisdom. He then details modern affluence in terms of the economic and social implications. Finally he presents what he considers needed changes in economic policy to assure equity and long-term economic stability.

“Conventional wisdom” is a continued theme of the book. In this Galbraith emphasizes the need to connect “events and the ideas which interpret them” (1998, p. 6). Galbraith, like Simmel describes how connections between our actions and the original motivations for these actions have been lost. Galbraith views this in terms of the shift

from an economy of scarcity to one of affluence with monetary policy to match. This conventional wisdom, that policy should be focused on production, disregards the shift from scarcity to affluence. The United States obsession with production (and increasing production through political action or inaction) is therefore the result of history, psychology, tradition, and the desire for security. The continued archaic focus on production has mutated the economic system into one where goods are simply manufactured for consumption (and evermore so for planned obsolescence) to facilitate the production of more goods. What has resulted is an “elaborate and ingenious defense of the importance of production” in an economy that has moved beyond the need to focus solely on production (Galbraith, 1998, p. 114).

These three authors highlight several important points. First, viewing the economy as one of excess rather than scarcity does not assume that natural resources are finite. Rather, it is a way to reimagining how we conceive of the flow of material required for any system. The global system to Bataille is interconnected, making it possible for more equitable distribution of resources, and taking his argument one step further, environmental harms. This alternative lens opens up possibilities for resource use and distribution. Bataille and Baudrillard also provide alternative conceptualizations of waste within an economic system. Waste can at times be seen as positive when in the context of festival and ritual. This role of positive waste has been lost in modern times. Rather than waste for unifying social purposes¹² wasting is bureaucratized, individualized, and fails to even serve well the pleasure of the individual.

¹² This is in no way to assume that the wasting in primitive societies was in any way equitable, or positive for all those involved. Accounts given by Bataille do include the “wasting” of humans.

Finally Galbraith provides a critique of scarcity rooted in national economic policy. He criticizes the antiquated focuses on production as a measure of economic success. This view encourages the (destructive) idea that production can consistently be maintained outside of any scope or limit, or at least does not assume that natural limits are of any great or real concern. This work is important because it provides a critique of the positioning of production within the context of the national economy that can be extended generally to nations across the globe. All three authors provide alternative ideas to conventional wisdom. This provides an important starting point for critique discourses of waste in relation to scarcity. The economic positioning introduced in this section is further discussed in chapter four. The purpose of the analysis here is to connect waste and the economy with a literature review of social theory.

2.4.3. Waste as individual? Waste as collective?: property rights and waste

“Every morning I watched from my vantage point as a packer truck compacted my peanut butter jars and chicken bones with those of my many, many neighbors. What had been mine was now, unceremoniously, the city’s”

(Royte, 2005, p. 24)

In the market economy consumer “sovereignty” is viewed as an individual “right” (Cooper, 2005, p. 53). This “right” greatly effects how we define and think about garbage today because it is based in the privatization of the management of waste/ing. Waste thus becomes a “private responsibility” (Scanlan, 2005, p. 124). At the same time, modern waste disposal practices have allowed the ability to “forget garbage” because the “individual responsibility for garbage has, of necessity, been destroyed, destroyed as a condition of progress” (Scanlan, 2005, p. 163).

In his book *The Political Theory of Possessive Individualism*, C.B. Macpherson (1962) establishes his model of possessive individualism by describing the roots of

modern conceptions of property characterized through the individual, as possessor of one's own capacities, existing in a system of exchange. In this system, as framed by Macpherson, one has no obligation to the larger moral society and owns one's individual capacities without obligation. Society, and by extension the political system, is a "relationship of exchange between proprietors"¹³ and serves as a mechanism to regulate and maintain a place for the existence of free market relations (Macpherson, 1962, p. 3). This speaks to both the role of the individual and to how individuals interact within society. The implications of possessive individualism therefore directly shape contemporary Western ideas of "freedoms, rights, obligations, and justice" (Macpherson, 1962, p. 3).

Possessive individualism exists and results in a possessive market society. As this possessive market society moves towards full capitalism classes of possessors and laborers logically emerge. The creation of the new class (labor), one "which could envision alternatives to the system, thus destroying the social fact (acceptance of inevitable market relations) which had fulfilled the first prerequisite of an autonomous theory of political obligation" creates an opening for inconsistency (Macpherson, 1962, p. 273). With universal suffrage and democratic ideals extended to both possessors and laborers, cohesion of the class determining the "rules of the game" is no longer assured and most likely diminished due to class differences. This theoretical basis is further weakened and increasingly contradictory with the development of the full market economy. Macpherson (1962, p. 276) argues that even with these inconsistencies in the foundation of democratic liberalism, the possessive market society has continued to

¹³ Proprietors who mostly no longer exist.

operate because of the “ability of a possessing class to keep the effective political power in its hands in spite of universal suffrage.”

Macpherson (1962) uses the theory of possessive individualism to examine why and how inherently contradictory notions of property and ownership exist and are maintained within a liberal democratic political and market-based economic system. Despite changes in production and consumption patterns since the seventeenth century, possessive individualism, as theorized by Macpherson, continues to be maintained and reinforced.

Possessive individualism interplays with the placement of the responsibility for disposal of waste on a party other than the producer of the product - an externality. A.C Pigou first identified the concept of the externality as a result of market failure to assign responsibility for a created cost during the consumption or production process (Quiggin, 1988). To remedy this inequitable distribution of cost onto a non-responsible party, Pigou (1924) proposed the imposition of a tax equaling the marginal private and social cost on the party who produces/creates the externality. Coase (1960a) also attempted to remedy the consequences of externalities, proposing the establishment of the right to pollute as a property right. To Coase it did not matter which party “owned” the property right, as with Pigou, but simply that rights are owned and responsibility is assigned. Using Coase (1960) as a basis, Dales (1970) first applies this concept of property rights to pollution, an extension that can logically be made to pollution in the form of waste.

This is important to the discussion of the role of waste in the economy because governments are increasingly identifying waste as an externality that must be accounted for by manufacturers of products. This pull between the individualism of the consumer and

the, up until this point, rights of the producer not to hold any responsibility for a product once sold, is reconceptualized through new policy tools. This policy tool, termed *extended producer responsibility* (EPR), is described at length in the next chapter. This chapter, thus, introduces the theoretical basis for this assignment of responsibility.

2.4.4. Waste, economy, production and the auto

Economically, the automobile is a fundamental component of the international production and distribution system (Paterson, 2007). Even if you do not own a car, your life, no matter where you live, is inherently tied to the global system of automobility through the movement of goods, services, and people in and around your existence. As previously emphasized the automobile is defined as “one of the principle socio-technical institutions through which modernity is organized” and remains unchallenged in dominance of the international, national, and in most countries, the local transportation system (Böhm, 2006, p. 1; Featherstone, Thrift, & Urry, 2005; Urry, 2005).

Automobile manufacturing also is linked through labor, jobs and production facilities to the domestic economies of most countries, and is used as a determinant of economic health and growth in international political economy literature (Paterson, 2007). Massive infrastructure investments in road systems and related built structures support government activities by facilitating the movement of goods for a healthy economy internally and support external military activities in the form of defense (from invasion) (Paterson, 2007). These built structures of automobility, fully entrenched in daily life, are very difficult to remove from society, creating and reinforcing path dependency in their use (Urry, 2005). It is in this pivotal role that the automobile is “implicated in a whole range of problems and contradictions in modern society”

(Paterson, 2007, p. 10). These problems and contradictions can be examined specifically through attempts to regulate, dictate, and organize the use of the automobile physically and symbolically in political, economic, and social relations.

The environmental impact of the vehicle is one of the most defining “problems” of the automobile in the late twentieth and early twenty-first centuries. Automobiles are a major sources of carbon monoxide and dioxide (Office of Mobile Sources, 1992a), ozone (Office of Mobile Sources, 1992b), volatile organic chemicals, and particulate matter (Department of Transportation, 2006). The driving of an automobile by a citizen is the most “polluting” daily activity in which the average person engages, contributing to the creation of around 30% of all global warming gasses (Environmental Protection Agency, 2011).

The automobile plays an important role in the economy. In this dissertation the automobile is viewed as both an object of consumption and an object of waste rather than a user of gasoline and a creator of emissions as with most environmentally focused critiques. This research differs from the social theory of those identified above in that it examines the automobile as a product of production and how this production is implicated in the process of automobile wasting. This is a positioning not always considered in the social, political, and economic literature regarding the automobile.

2.5. CONCLUSION: WASTE AND THE SOCIAL, POLITICAL, AND ECONOMIC

The purpose of this chapter is to create a foundation, based in social theory, for an analysis of the 2000/53/EC ELV Directive. By reviewing how waste/ing is positioned in social theory we develop a basis for understanding the formation and implementation of

government policies intending to manage the “problem” of waste. Important themes identified in this chapter are revisited throughout the remainder of this dissertation. Specifically, ideas of waste translate into understanding the development of waste management practices and procedures in chapter three; the economic foundations for waste frame the meso-level analysis developed in chapter four; the understanding of the positioning of the automobile in society reemerges in chapter five; and finally, notions of excess rather than scarcity are revisited in chapter six.

Overall, though, this chapter creates an economic foundation for the understanding of waste/ing grounded in social theory. Much of the literature in the broad, interdisciplinary field of discard studies identifies waste/ing as a problem of consumption, supported through micro-level waste analysis.¹⁴ As a problem of consumption the management of wastes, or solutions to “waste problems,” are focused (or blamed) on the individual consumer. These “solutions” target individual level consumption decisions through a variety of methods including shame, guilt, economic benefit, and at some times even patriotism. Chapter four provides a full description of micro and (its opposite still problematic) macro-level waste analysis. The purpose of this chapter, though, is to draw from the social theory literature that identifies production rather than consumption as the creator of waste. This literature, ignored in micro-level waste analysis, provides important support for the necessity of the consideration of the system of production in waste analysis. This chapter therefore provides a basis for this argument that is fully developed in chapter four.

¹⁴ This claim is fully addressed in chapter four as is noted below.

Chapter Three

POLICY RESPONSES TO WASTE MANAGEMENT: EXTENDED PRODUCER RESPONSIBILITY

3.0. INTRODUCTION

Waste creation and management is a universal activity of daily life. While we cannot, at least at this point, opt out of waste creation due to technological limitations and economic necessity, we can and do make decisions, as individuals and societies, as to how to manage waste. These decisions, often unexamined, have important economic, public health, and environmental consequences. While the previous chapter discussed waste/ing to create a theoretical foundation for the inherent economic basis of consumption, consumerism, and disposal rooted in social theory, this chapter addresses the motivations for, and concrete manifestations of, government action in the management of waste.

I begin broadly in examining government actions and reactions to waste. Tracing historical development from the 1800s, patterns of government action follow a similar trajectory in Western nations.¹⁵ Through this historical lens it is possible to identify

¹⁵ Since 1989 the environmental damage of heavy industry in the German Democratic Republic linked to the use of brown coal, rapid industrialization, and poorly managed disposal of toxic waste has been well documented (Charles, 1990). This toxic legacy, and associated differences in environmental history between the German Democratic Republic and the Federal Republic of Germany is of minimal relevance to the development and implementation of policies of extended producer responsibility or vehicle recycling. Policies of extended producer responsibility are only first implemented in Germany in 1991, and vehicle recycling legislation in 1998. This research, therefore,

incentives for government involvement in the regulation of disposal in addition to the collection, movement, and reduction of waste generated. In the literature government motivations for the management of waste tend to be grouped into three broad categories: environmental protection, financial/economic incentives, and response to public interest. Each of these motivations provides insight into how waste is identified as a “problem” and thus how governments elect to respond in the form of “solutions.”

Next I examine a specific government response to the management of waste: extended producer responsibility. Beginning in the 1990s countries such as Germany and Sweden, later followed by the European Union and nations such as Japan, pioneered innovative environmental policies focusing on end-of-life product regulations for items such as consumer packaging, automobiles, and electronics. Extended producer responsibility (EPR) policies require producers to “take responsibility” (financial and/or physical) for the disposal of products when they are no longer in use or reach what is more commonly termed “end-of-life.”

Extended producer responsibility is intended to decrease the amount of material disposed of in landfills and through incineration as well as make businesses financially responsible for waste disposal, a cost usually born by the government. The public has generally supported environmental efforts, at least in Germany, and this serves as a visible response to perceived increases in waste generation. This chapter describes extended producer responsibility as a policy tool to create an understanding for the

focuses on the Western experience generally, using specific examples from Germany that follow Western trends.

specific case study of this dissertation, the implementation of the *European Union 2000/53/EC End of Life Vehicle (ELV) Directive* in Germany.¹⁶

3.1. MODERN GOVERNMENT INVOLVEMENT IN WASTE DISPOSAL: AN OVERVIEW

3.1.1. Waste management in the 1800s: capital, safety, and mobility

Until the late 1800s in Western nations the management of waste was mostly conducted on the household level through continued material reuse, onsite incineration, or simply the pushing of material out of windows and onto streets (Strasser, 1999). Centralized, industrial production, only in the initial stages of development, provided few common resources to consumers. Most production therefore occurred within the household. Examples of thrift, actions seen reemerging in depression eras or economic downturns, were common practice; items were mended when worn or a new use was discovered when no longer functioning in original form. Spatiality affected onsite waste disposal practices in that with larger portions of the population living in rural areas, composting organic materials in gardens was prevalent. Animal disposal of food waste was also common practice in both cities and rural areas where pigs eliminated most organic material from the “waste stream” – i.e. unusable material to be disposed of outside of the immediate vicinity of the residence.

Disposal became more organized and regulated beginning in the mid 1800s. London, a forerunner in municipal waste collection, is one of the first modern cities to initiate a comprehensive waste collection system. In 1839 the city formed the Sanitation Commission to oversee waste management. Unlike other cities soon to follow, London’s

¹⁶ From this point forward the directive will be referred to as the 2000/53/EC ELV Directive.

initial motivation towards municipal waste management was unique and highly relevant to understandings of relations of waste, value, and production. The Sanitation Commission was formed as a reaction to the realization of potential (economic) value embedded within waste (Wilson, 2007). At the time the burgeoning industrial revolution required exponentially increasing amounts of resources as inputs for production. Without the development yet of mass extraction technologies for virgin materials, waste was eventually needed to serve as feedstocks in the manufacturing of products such as cloth and paper. London's early collection effort, different from other cities of the time, is important to note because it illustrates the ties between the municipal management of waste and economic forces of production.¹⁷ Capitalism, newly flourishing, required such an expansion in the use of raw materials for production that materials once discarded became necessary drivers for the engines of production.

The sanitation movement is considered the major driver for modern waste management practices in urban, and later rural, areas beginning in the 1880s (Wilson, 2007). Scientists such as Louis Pasteur and Robert Koch at this time connect sanitation practices to the spread of bacteria and viruses (Bilitewski, Härdtle, & Marek, 1996). Waste, always viewed as toxic and taboo, was removed from streets in efforts to prevent outbreaks of cholera and other illnesses. This new problematization of waste spread beyond illness, linking uncollected (or unmanaged) material to various forms of social "disease" such as unrest in urban areas (Rogers, 2005). Waste removal and attempts to "clean up" the city in this context focused on areas with low socio-economic status. Waste is therefore problematized as both a disease facilitator and a social stigma.

¹⁷ This relationship is further illustrated through productive capital loops described in the chapter four.

By the 1890s, material recovery facilities (MRFs), operating in major cities in Germany including Berlin, Hamburg, and Munich, processed high volumes of municipal waste fairly efficiently in an effort to improve urban sanitation (Bilitewski et al., 1996). The collection of this waste created the ability for people to dispose of large amounts of unwanted material, previously not available, increasing the amount of waste thrown away. Items that were once valued or at least for which some type of value/use was found became garbage because of ease of disposal. Rathje and Murphy (2001) describe this as “Parkinson’s Law of Garbage” in that the amount of garbage created is proportional to the space available in trash receptacles (the more space available for disposal, the more material is thrown away). Therefore as ease of disposal increases, volume of disposal increases.¹⁸

Industrialized production coupled with economic changes rooted in capitalism, encouraged disposal rather than reuse practices due to increased availability of mass-produced, low cost products.¹⁹ This accelerating speed at which products are designated for disposal (shorter product “lives”) and volume of material disposed of continues increasing from this point forward, mirroring economic growth and expansion.²⁰

As industrial production in cities increases, efficient transportation of products becomes progressively more important. Waste, previously thrown into the streets from

¹⁸ Cities today in the United States for example are reducing the size of trashcans provided to the public or allowed for use to discourage waste production.

¹⁹ Changes in industrial production due to capitalism are further discussed in chapter four.

²⁰ It is important to note that Germany’s annual total waste generation has declined since 2000 from a total of 406.7 million tonnes (including municipal, mining, production and commercial, construction and demolition, and hazardous wastes) to 344.6 million tonnes in 2008. This is linked (by the German government) to efforts taken to decouple waste generation from economic expansion through efficiency and producer responsibility measures (BMU, 2010).

home windows, creates difficulty in efforts to move large volumes of newly produced products. A further driver for institutionalized municipal collection infrastructures in many cities was the need for unobstructed pathways (literally a clear road) for economic “progress” (Melosi, 2005).

3.1.2. In the wake of World War II: environmental, financial, and public concerns

The efforts to fight World War II required massive economic mobilization in both the Allied and the Axis countries. This is evident in the increased gross domestic product of almost all countries participating in the war up until 1945 (Harrison, 1998). New efficiency practices and technologies developed during this period dramatically improved the ability for rapid, amplified product production. In the post-war era factories were left with the ability to produce larger number of products with greater efficiency than were created before the war. The problem was, though, the lack of demand for military weaponry. The maintenance of wartime production levels, important to stabilizing the economy and eventually lead to growth, required changes in consumption habits of citizens, specifically an increase in product purchasing.

Increased purchasing by citizens was aided by general economic prosperity resulting in additional “disposable” incomes for families. The emphasis of this period is one of consumption rather than disposal. Product values/valuation decreased, increasing the availability of relatively inexpensive, easily purchased products available (due to mass production) that consumers could afford (through credit or post-war affluence) (Galbraith, 1998). As described by Vance Packard in 1960 (p. 8) “wastefulness has become a part of the American way of life.” While the shift towards increased

consumption of products of lower value was a more stark change in the United States, European nations have followed this patterned generally.

Danay and Frank (1972) describe how in addition to increased waste production, recycling levels post-WWII era declined. First, citizens employing procedures using recycled material as feedstock found it increasingly difficult to compete with cheap, high quality virgin material. Extraction efficiency greatly increased during wartime manufacturing leading to investment in the extraction process and decreasing costs. The number of products introduced into the waste stream without a recycling collection system in place, for example plastics, also increased in numbers. With this increase small business found it difficult to collect materials for recycling in that recyclable composed less and less of the municipal waste stream. Finally, the use of convenience products decreased interest in sorting recyclables from rubbish at the household level. Decreasing levels of recycling, coupled with increases in the amount of waste generated, are therefore major characteristics of this period.

Both the volume and composition of waste for disposal changed greatly in the post-World War II era. Mass production, planned obsolescence, and advertising-focused product packaging lead to growing levels of garbage. Availability of cheap, disposable products increased. These new products were composed of new a material: plastic. The “chemical age,” rooted in technological developments triggered by war efforts resulted in plastics filling homes and eventually domestic and industrial garbage bins. Plastics “promised a material utopia available to all” in the form of an exponentially increasing selections and uses of disposable products (Freinkel, 2011, p. 25).

Increased consumerism/consumption and the use of chemicals in products are often linked in the waste literature both with increased volumes of waste as well with as increased waste toxicity (Tammemagi, 1999). As discussed in the previous chapter the reaction in the social theory literature is one of linking consumerism to alienation. In engineering and materials management literature the result is a focus on toxicity in the product disposal phase. Both reactions, though, are important in understanding responses to waste management in the wake of the Second World War that continue to frame government action today.

Although areas of waste disposal have always been considered toxic and taboo places (Douglas, 1984), scientists in the 1950s began documenting the negative effects of waste disposal in uncapped and unlined landfills on human and ecosystem health. This led initially to the capping, or layering of material such as dirt, over newly dumped trash on a regular basis to cover new materials placed in landfills to decrease odor and the attraction of pests (Tammemagi, 1999). By the 1960s and 1970s, though, growing awareness of landfill contamination of ground water led to the legislation of the use of caps, liners,²¹ and the capturing of leachate and gasses in newly constructed landfills (Tammemagi, 1999). This body of knowledge/awareness was eventually institutionalized, leading to the professionalization of waste management and the science of processing waste (Wilson, 2007). By the end of the 1970s in most Western nations,

²¹ Liners create a barrier between the garbage and the soil both on the sides and bottom of landfills. The purpose is “complete encapsulation” which “occurs if the sealing effect of both liner elements [the sides and bottom] is permanent and the release of contaminants occurs only via monitored systems for leachate collection and gas venting” (Bilitewski, Härdtle, & Marek, 1996, p. 273).

governments regulated where and how waste, previously dumped in convenient locations, could now be disposed.

Beginning with the modern environmental movement of the late 1960s and 1970s, citizens in Western nations, and especially Germany, begin opposing the building of new landfills and incinerators due to ecological and environmental concerns (Boehmer-Christiansen, 1994). Rooted in ever expanding use of resources and the seeming absurdity of the amount of trash created, calls to action to reduce waste generation and make its management more ecologically friendly (especially through recycling and composting) became increasingly common.

In the Federal Republic of Germany, strict new landfill regulations implemented in 1975 resulted in the closing of more than 3700 of the 4000 operating landfills due to inability to meet regulatory compliance (Fishbein & Azimi, 1994). These federal regulations also resulted in cost increases in the waste management industry.

Technologically advanced liners and caps as well as leachate and methane collection systems are expensive features to incorporate into landfill design and construction. With so many landfills closed, it was necessary to build more landfills to meet waste management needs. Finding suitable locations for the construction of new landfills, though, was also challenging. NIMBY (not in my back yard) complaints led to increasing difficulty in locating unopposed sites within easy access to municipal areas, further increasing waste disposal costs by pushing management facilities out of urban areas.

These factors (environmental, economic, and public concern) led to stark realizations of the limitations of landfilling as a waste solution prompting the German Federal Environmental Ministry in 1990 to state: “In order to head off a threatened waste

disposal emergency as early as possible it is necessary to take decisive waste avoidance measures” (BMU, 1990). An immediate response to this call was the creation of the *Packaging Ordinance of 1991*, the first instance of any government requiring the producer of a product to fund the product’s cost of disposal (extended producer responsibility). Extended producer responsibility is further discussed in the next section.

3.1.3. Defining the problem of waste

The *Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives*²² frames the current discussion of waste management by defining the “problem” of waste. This directive repeals previous waste directives (75/439/EEC, 91/689/EEC and 2006/12/EC) with the purpose of decoupling waste planning and management from the (up to this point) relationship between growth and waste generation. The directive “lays down measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use” (European Commission, 2008, p. 8).

The directive emphasizes the importance of clarity in the definition of waste:

to strengthen the measures that must be taken in regard to waste prevention, to introduce an approach that takes into account the whole life-cycle of products and materials and not only the waste phase, and to focus on reducing the environmental impacts of waste generation and waste management, thereby strengthening the economic value of waste (European Commission, 2008, p. 4)

This reasoning for the need to more clearly define waste is interesting for several reasons.

First, it emphasizes that for the optional manage of waste, waste must be well defined.

This acknowledges in the weakness of previous EU legislation (referenced earlier in the

²² From this point forward referred to as the 2008/98/EC Waste Directive.

directive) which is criticized for failing to provide a clear definition of waste and thus leading to various disposal loopholes. Second, it establishes that waste management is not merely an end-of-life activity but rather encompasses the entire process of material production and use. This provides an opening for policies of extended producer responsibility, illustrated in the following section. Third it recognizes waste as an environmental “problem;” the importance of this problem definition is discussed in a further section. Finally it acknowledges, what is referred to in the next chapter as the role of waste in the circuits of productive capital, the value of waste economically. This directive frames the “problem” of waste and this problematization thus provides an important framing of this research.

3.2. EXTENDED PRODUCER RESPONSIBILITY

3.2.1. Setting the standard: 1991 Packaging Ordinance

One policy tool that emerged in the 1990s to address the cost of disposal, the environmental impact of waste management, and public cries for waste diversion and reduction is “extended producer responsibility” (EPR). The German *Packaging Ordinance of 1991*, as previously mentioned, is the first example of the use of extended producer responsibility in federal legislation requiring producers to fund the cost of product disposal at end-of-life. This legislation establishes the basis for the *Duales System Deutschland GmbH* (DSD), an organization coordinating the recycling of consumer packaging material. The costs of implementing the DSD activities are paid by participating companies. Though participation is not required, most companies do opt to participate. The DSD organizes the collection and recycling of participating material

designated with a “green dot” (in German *der Grüner Punkt*). Packaging material is collected from public areas and private residences, separated, and recycled.

The *Packaging Ordinance of 1991* and subsequently the establishment of the *Duales System Deutschland* was initially considered both a revolutionary system for waste management as well as a policy with radical potential (Fishbein & Azimi, 1994). A press release announcing the program states: “this ordinance, unlike any other regulation taken up to now, marks the final abandonment of the throwaway society” (Federal Environmental Ministry BMU, 1990). With lofty goals this policy was instituted to enact fundamental change in waste management by prohibiting producers from externalizing costs of waste management at product end-of-life.

While the policy specifically legislates the recycling of product packaging, it is of importance to EPR discussions generally as it has served as the framework for all subsequent German and European Union EPR legislation including the 2000/53/EC ELV Directive. The four objectives of the legislation are to: 1) promote the use of environmentally responsible material, 2) minimize packaging by weight and volume, 3) promote the use of refillable (reusable) products when possible and 4) guarantee recyclability and recycling of products when not refillable are maintained in future legislation²³ (Fishbein & Azimi, 1994). The *Packaging Ordinance of 1991* has shown success in the collection and recycling of packaging material. Recycling rates for the packaging materials of glass, aluminum, and tins (tin/steel cans) have increased from 36.8%, 16.6% and 37.1% in 1991 to levels of 82.2%, 80.0% and 94% respectively in

²³ EPR legislation is product specific taking into account product related characteristics. For example the vehicle recycling EPR legislation focuses on recyclable and reuse of components in new production rather than refillability which is included in beverage container legislation.

2008 (BMU, 2011, p. 16). Common themes that we see resulting from this initial legislation are therefore the encouragement of “greener” production material, the promotion of reuse, and the guaranteeing of recyclability when reuse is not possible.

Building upon the success of the *Packaging Ordinance of 1991*, the *Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal*, initiated in 1996, legally incorporates producer responsibility, in the form of the polluter pays principle, into German waste management law generally. This law establishes the waste management hierarchy (waste avoidance, waste recycling, and waste treatment, in that order) and assigns responsibility for the implementation of it to producers. With this act as a legal basis the German government has legislated ordinances and voluntary agreements specifically regulating management of various types of wastes. A motivation for policies of producer responsibility as stated by the German government is that when these types of regulations are legislated, “producers and distributors must design their products in such a way as to reduce waste occurrence and allow environmentally sound recovery and disposal of the residual substances” (BMU, 2010). This is important to note as this follows along the proposals of positive benefits acknowledged in the literature of implementing EPR policies.

Extended producer responsibility policies are not limited to use only in Germany. Since the mid-1990s EPR has been frequently employed as a method for the management of both voluntary and mandatory practices at the national level by many OECD countries (Gertsakis, Morelli, & Ryan, 2002; Walls, 2006). The European Union is most aggressive with the use of this type of legislation implementing three far-reaching extended producer responsibility directives for consumer packaging, electrical and electronic waste, and

vehicle disposal. Iterations of EPR are also found on the federal level in countries such as Canada, Brazil, and Japan and on the sub-national level in the United States.

3.2.2. Extending producer responsibility

Extended producer responsibility is described as “a policy principle to promote total life cycle environmental improvements of product systems by extending the responsibilities of the manufacturer of the product to various parts of the entire life cycle of the product, and especially to the take-back, recycling and final disposal of the product” (Lindhqvist, 2000, p. 154). The OECD (2001, p. 9) expands this definition by describing the two specific EPR features as “(1) the shifting of responsibility (physical and/or economically; fully or partially) upstream to the producer and away from municipalities, and (2) to provide incentives to producers to incorporate environmental considerations in the design of their products.”

Extended producer responsibility is an offshoot of the producer pays principle,²⁴ designating the producer responsible not only for the financial implications of pollution created during product manufacturing, but also for the environmental impact of the product in the disposal phase (Beder, 2006). Extended producer responsibility is characterized legally as an “ecological extension of product liability law, making producers responsible for long-term environmental management of their products, and its

²⁴ The polluter pays principle (*Verursacherprinzip*) is one of five fundamental principles of German environmental policy (O’Riordan & Cameron, 1994). Codified in the Treaty Establishing the European Community it is first noted in EU documents in *Directive 2004/35/EC of the European Parliament and of the Council of 21 April 2004*. This legislation creates environmental liability for direct or indirect damage to the environment. The purpose is to 1) prevent damage by assigning liability and 2) provide for financial cost of damage remediation through determined liability.

goals are similar in many respects to product liability law, such as reducing “injury” and spurring improved product design” (N. Sachs, 2006, p. 53).

3.2.2.1. Forms of extended producer responsibility policies

Government policies mandating extended producer responsibility require companies, in some form, to “take back” specific products when those products reach “end of life” and the owner of the product determines the product is no longer useful. How and to what extent producers actually take responsibility for the disposal of products can vary depending on the actual legislation. Responsibility can be designated as either physical (producers must collect the products and physically facilitate disposal) or financial (producers must pay the cost for disposal) (Toffel, Stein, & Lee, 2008).

The *Duales System Deutschland* (DSD) is an example of how producers take financial rather than physical responsibility of products at end-of-life. The DSD is a product responsibility organization (PRO) or third party that coordinates the collection and recycling consumer packaging per the *Packaging Ordinance of 1991*. In return, participating companies pay a fee to offset collection and management to the DSD. The benefits of PRO collection include the use of a greater number of collection facilities (and a shorter distance for products to travel), ease of participation for small companies, the ability to develop expertise and specialization in the recycling process which may lead to increased prices for processed materials, and the capacity to address orphaned or imported products collectively (Spicer & Johnson, 2004). Two major drawbacks occur in the context of encouraging “design for recycling” when PROs are used to collect and recycle products. First, products from each manufacturer are not collected in a separate stream. Rather, all products, regardless of original manufacturer, are collected in one

place. This creates ease in recycling for consumers and streamlines the collection process for the PRO. The result is that streams of material collected for recycling are not collected in such a way as to facilitate return to the original manufacturer, although hypothetically this could occur. Second, since materials are not returned to the original manufacturers for recycling into new products, there is decreased feedback to product designers as to how to increase product recyclability.²⁵

While extended producer responsibility is widely discussed as a concept, there is no one standard for EPR in policy formation; rather most policies are heavily influenced by state-specific factors such as political, economic, and social climates of the time. How each of these factors effects the creation and implementation of vehicle recycling policies in Germany is discussed in future sections of this dissertation.

3.2.2.2 Benefits of extended producer responsibility: governmental, environmental, and corporate

Literature examining extended producer responsibility policies tends to group benefits of its into various broad categories including decreased waste disposal costs for governments, decreased negative environmental impact, and the creation of a source of feedstock (recycled content specifically) for production. Benefits are therefore proposed for the government, the environment, and producers of products.

With the collection, processing, and disposal of products at end-of-life typically externalized by producers, costs for waste management are born by the government (Toffel et al., 2008). Limited budgets and increasing costs for disposal serve as

²⁵ This point is especially important in the discussion of the implications of end-of-life vehicle disposal that currently coordinated by companies other than vehicle manufacturers.

motivators for government policies to manage waste through reduction programs. With extended producer responsibility, the costs associated with disposal are transferred from the government to the producer. Thus, the “polluter” in the form of the producer, “pays” to alleviate the pollution it created removing this burden from the government.²⁶

Several environmental benefits are identified in the use of extended producer responsibility policies (EPR). EPR is proposed to encourage recycling (typically a function of private industry generally) and reuse of products rather than disposal (a function of the government). Further, the transfer of responsibility is an attempt by governments to encourage producers, who are responsible for disposal, to incorporate end-of-life strategies other than landfilling²⁷ or incineration into product design. This is proposed under the idea that corporations, having to pay for the cost of waste management, are encouraged to promote recycling, a less costly disposal option, over landfill disposal. Lindhqvist (2000, p. 154) emphasizes this motivation in EPR policies “to combine economic responsibility with the physical responsibility is a way to secure a correct and reasonable cost for the handling of the product, and it is also a way to give control of the organization of the system to the actors that are responsible for covering the costs.” As identified in chapter two, this assignment of property rights corrects for the

²⁶ It is, can, and perhaps should be a matter of debate as to “who” in the process of extraction, processing, producing, distributing, and consuming is the actual “polluter.” The “who” is generally identified as the party who can most directly effect the reduction or elimination of pollution at the least cost. There is a substantial body of literature arguing that the burden of pollution should be shared among all parties involved in production, use, and disposal. Product Stewardship, as it is termed, is a more popular responsibility strategy in the United States.

²⁷ One of the earliest motivations for EPR policies identified in Europe was as a response to filling landfills (Lenzen, Murray, Sack, & Wiedmann, 2006).

market failure of the externalization of waste as identified by Pigou (1924) and further applied by Coase (1960b).

Further, extended producer responsibility is rooted in the environmental economic theory of the Porter Hypothesis: “Porter asserts that strict, correctly formulated environmental regulation can offer a firm secondary benefits through improved product design and the reduction of waste” (Crotty & Smith, 2006, p. 95).²⁸ Though only targeting the process of waste disposal, the assumption is that by assigning producers the responsibility for waste disposal (financially or physically) producers will re-think the production process and re-design products for easier disassembly and recycling. Additionally the assumption is that the high cost of hazardous material management and disposal will also discourage use of these materials in the production process. Thus EPR policies are purposed on the basis that they may increase the reclaiming of hazardous and valuable material, especially in electronic products, reducing potential negative impacts on public health (Bohr, 2007; Pongrácz & Pohjola, 2004).

Benefits are also enumerated in the literature for producers in implementing extended producer responsibility practices (Pagell, Wu, & Murthy, 2007). The impacts of these benefits, though, depend on how EPR policies are designed. Extended producer responsibility policies typically utilize three types of policy mechanisms to designate how products must be processed at end-of-life: take-back requirements for producers; economic instruments such as deposits, refunds and taxes; and/or performance standards (Subramanian, Gupta, & Talbot, 2005). Each of these mechanisms creates a different

²⁸ As is also shown by Crotty and Smith (2006), the implementation of this hypothesis faces many barriers in practice in extended producer responsibility.

political and financial relationship between producers and the government. Producers actually collecting created products (take-back requirements), instead of designating reprocessing responsibility to third party producer responsibility organizations (PROs), have the benefit of guaranteed (to some extent) material feedstock for future production. Production costs may be reduced when using collected material because recycled materials have embedded value having already been initially processed (and therefore requiring less energy use in reprocessing). This value tends to be product specific, with materials such as metals yielding a high rate of return while plastic recycling can be more expensive and yield a lower rate of return monetarily (Kroepelien, 2000). Recent concerns regarding accessibility to key materials required in productions such as rare earth metals increase, may also become a progressively more beneficial aspect of EPR legislation for producers (Wilts, Bringezu, Bleischwitz, Lucas, & Wittmer, 2011). The implementation of extended producer responsibility may also improve a company's public image, providing public relations and marketing benefits (Fishbein, 2000). This is important as consumer demand for environmentally friendly products increases (Fishbein, 2000).

An interesting and frequently less discussed benefit to producers in instituting EPR policies is the protection of intellectual property and the forcing of increased product sales (Pagell et al., 2007). Even without government regulations companies have enacted practices of extended producer responsibility for intellectual asset protection. Xerox™, for example, does not release products into the “public” waste stream but rather internalizes all product disposal. Xerox™ does by not selling any products, it is impossible to “own” a Xerox™ product; rather the product is rented, repaired as needed

through the corporation, and then returned to the corporation at end-of-life. Economic motivations for this practice are twofold (Waldman, 1997). First, intellectual property is protected by not allowing products to enter the “environment” where competitors could deconstruct the equipment in an attempt to understand and gain access to the patented technology. Second, this practice eliminates the possibility of purchasing a used or “secondhand” copier, therefore forcing continual new product purchasing/leasing. Xerox™ found it economically profitable to dispose internally of all copy machines to reduce intellectual property “theft” and create a market dependent upon continued interaction with the company through the provision of a service.

3.2.3. Extended producer responsibility and the 2008/98/EC Waste Directive

The 2008/98/EC Waste Directive is the legal framework of the European Union, establishing rules for the treatment of waste.²⁹ Chapter II, Article 8 of the 2008/98/EC Waste Directive addresses extended producer responsibility stating that: “In order to strengthen the re-use and the prevention, recycling and other recovery of waste, Member States may take legislative or non-legislative measures to ensure that any natural or legal person who professionally develops, manufactures, processes, treats, sells or imports products (producer of the product) has extended producer responsibility” (European Commission, 2008, p. 12). This legal framework thus allows for state level implementation of EPR policies for specific materials not already regulated by the European Union.

Of note in the designation of the parameters for the use of EPR in this directive is the acknowledgement by the European Union that member states can determine who is

²⁹ The directive describes waste as “any substance or object which the holder discards or intends or is required to discard” (European Commission, 2006, p. 9).

designated as holding “responsibility” for the processing and disposal of waste. While this generally falls to the “waste producer” or “anyone whose activities produce waste (original waste producer) or anyone who carries out pre-processing, mixing or other operations resulting in a change in the nature or composition of this waste,” this responsibility is not pre-determined/inherent but rather determined by the state (European Commission, 2008, p. 9).

Finally, also of importance is that the allowance for state level policies of extended producer responsibility is not without economic caveat: “When applying extended producer responsibility, Member States shall take into account the technical feasibility and economic viability and the overall environmental, human health and social impacts, respecting the need to ensure the proper functioning of the internal market” (European Commission, 2008, p. 12). This raises questions of the implications of interaction among the environment, the economy, and the market are further discussed in chapter four.

3.2.3. Extended producer responsibility and the auto: vehicle disposal laws

The German *Packaging Ordinance of 1991* and the 2008/53/EC Waste Directive provide the foundation for product-specific recycling legislation. With the German *Packaging Ordinance of 1991* first introducing the a national model of extended producer responsibility and the 2008/53/EC Waste Directive codifying it in European Union law and policy, the way was opened for further iterations of this form of regulation: vehicle recycling. In order to understand how and why vehicle recycling became a focus in Germany and later the European Union, though, it is important to understand the history of vehicle disposal.

Although the environmental impacts of automobiles are well documented today, it was not until the 1970s that states began regulating various effects of automobile production and operation. The first regulations were initiated both within the context of environmental protection (specifically relating to tailpipe emissions and air pollution) and economic security (dependency on foreign oil which at times led to price volatility). Vehicle recycling, the focus of this research, only became a target of government legislation in the late 1980s. As noted by Kroepelien (2000, p. 165): “the fine-tuned mechanism for production and consumption of products developed over 50 years in the EC has not been accompanied by a similarly advanced mechanisms for waste management.”

Interesting, though, an industry did exist for the recycling of automobiles before government intervention into vehicle disposal practices. Dating back to early days of vehicle production autos have historically been, and continue to be, one of the most recycled and recyclable consumer products (Lucas, 2001).³⁰ The target of vehicle recycling policies therefore must be considered to address issues beyond simply the existence of a recycling infrastructure.

Three factors are commonly associated with calls for end-of-life vehicle disposal regulations. First, disposal of automobiles requires the management of not only of high value recyclable materials such as metals, but also the disposal of hazardous waste and other components and fluids that release toxic emissions (European Commission, 2000). The European Union estimates that around 25% of the weight of cars can be considered

³⁰ On average 75-80% of a car can easily be recycled due to metal content without government support or regulation of the industry (Bellmann & Khare, 1999; Ferrã, Nazareth, & Amaral, 2006).

hazardous waste, making up more than 10% of total EU hazardous waste production (European Commission, 2000). The potential harm of improper disposal of vehicles is therefore substantial.

A second factor often contributed to the creation of end-of-life vehicle (ELV) regulations is the problem of abandoned vehicles (Spicer & Johnson, 2004). Abandoned cars in Sweden were so numerous in the 1970s for example that the government passed legislation requiring car scrapping (recycling at end-of-life). Citizens were required to obtain a certificate of destruction for all ELVs showing that were recycled rather than abandoned (Forslind, 2005). The Swedish government was motivated by the high cost of processing and disposal of abandoned vehicles which fell to the government (GHK, 2006a). By requiring assurance of proper disposal by the final owner the government is better able to control/halt this form of hazardous litter.³¹

Finally, the recyclability of the automobile as a whole (by volume) began decreasing in the 1970s with increased use of plastics in manufacturing. This is due to two specific features of the recycling process (Lucas, 2001). First, cars are traditionally shredded for recycling. While it is easy to remove ferrous and nonferrous metals after the shredding process through the use of magnets and eddy currents, plastic recycling is more difficult to manage because of the inability to separate plastic composites by type after shredding in that there is no parallel technology such as magnets and currents used with metals. Second, due to the molecular structure of plastics, simply applying heat will not automatically break apart molecules. Rather different plastics require different degrees of

³¹ Although this argument seems to contradict the statement that automobiles are one of the most recycled products, it should rather be taken to illustrate state level differences in interpretations of waste “problems.”

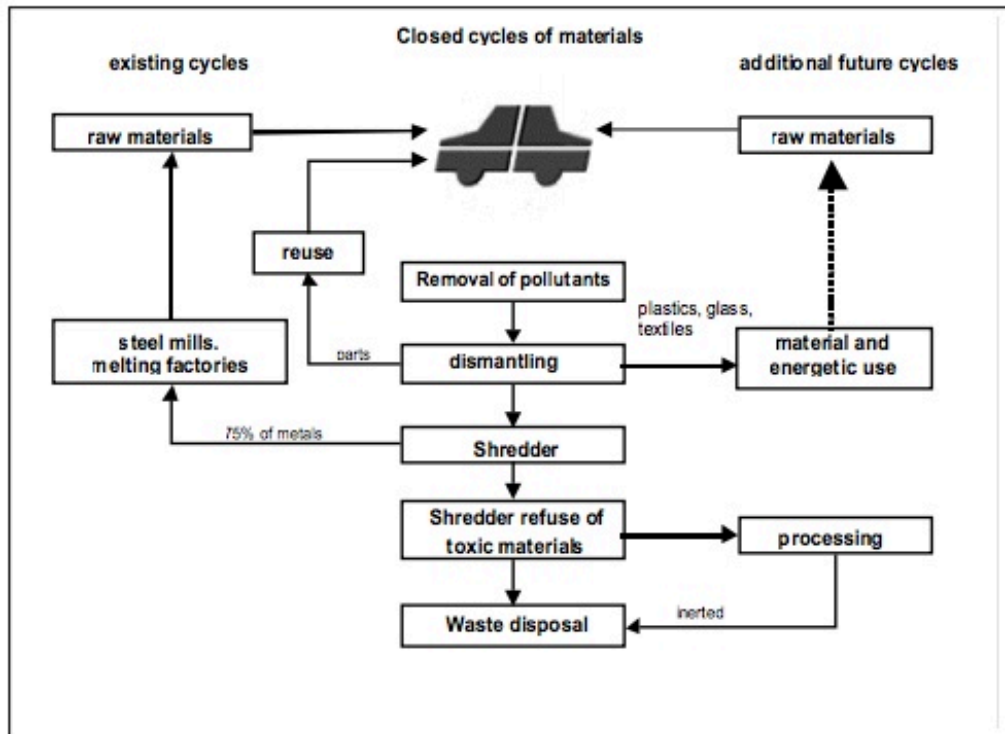
heat application. Plastic recycling therefore requires the segregation of plastics by type of composites and form of molding. Finished products such as automobiles are often composed of many different types of plastic composites increasing recycling complexity and eliminating the possibility for recycling when plastic components are not segregated.

Options are available for increasing plastic recycling in the deconstruction process. Pagell *et al* identifies two choices of procedures for ELV recycling. The first is “grind and sort” or “recycling without disassembly” (2007, p. 135). This is a rudimentary method, as described above, where cars are shredded first to separate out high value metals. The major benefit of this process is that it is low cost, a majority of the labor required is provided mechanically. Drawbacks include a low material recovery rate for non-metals and little incentive for “learning” in the re-designing of the vehicle for ease in recycling. This is because the design of the vehicle does not matter when the vehicle is first shredded in the recycling process at end-of-life. The second option described by Pagaell *et al.* is “recycling with disassembly first” (2007, p. 135). Disassembly takes place for two reasons. First, reusable parts in working order are removed from the vehicle. These parts are either sold as “used” or reused in new vehicle construction. Second, high value materials that are easy to remove or whose value is degraded in the shredding process through contamination are removed. This can yield much higher total material recovery rates as well as higher values for the individual materials recovered because they are in a more pure form. This process is time consuming and does require more complex, labor-intensive recycling equipment.

Though it appears that two recycling choices exists, vehicle recycling generally follows the same steps regardless of which company is facilitating the recycling process

(Ferrã, Nazareth, & Amaral, 2006). First, high value parts are removed such as batteries and catalytic converters. Next the vehicle is shredded by a hammer mill into pieces the size of a fist. At this point ferrous and nonferrous materials are separated. The remaining material, automotive shredder residue, is generally disposed of in a landfill. It is this material, automotive shredder residue, that ELV legislation primarily affects. Unlike the highly developed and lucrative metal recycling markets, the value of automotive shredder residue is considered non-existent due to the fact that it is a mixture of many different types of plastic that are unable to be separated and therefor recycled (Konz, 2009). The figure below illustrates the material flow of end-of-life vehicles.

Figure 1: Material flows of ELV



Source: author

Fig. 3.1. [used with permission]
Material flow of end-of-life vehicles. (Lucas, 2001)

3.2.4. *Altautoverordnung*: vehicle recycling in the German case

With a strong automotive sector and a history of innovative environmental policy Germany³² is one of the first countries to institute vehicle recycling legislation on the national level. This process was not instantaneous with the immediate passage of sweeping legislation. Rather, over the course of almost a decade, the German government worked with automakers to craft recycling responsibility legislation.

³² Both of these characteristics are further discussed in chapter five in the methodology section.

This process began officially in 1990 when the German Environment Ministry invited industry to comment on a government proposal developing a policy to make producers responsible for disposal of vehicles at end-of-life. In 1992 the German Environmental Ministry (BMU) released the “Draft Regulation about the Avoidance, Decrease and Recycling of Wastes from the Disposal of Automobiles,” commonly known within the industry as the Car Scrap Rule. The goals of the proposed rule as stated by Davis and Kincaid (1994, p. 5) included:

- 1) “developing, designing and producing automobiles and automotive parts and accessories that have a service life of "as long as possible" and that can be easily disassembled for reuse or material recycling;
- 2) “using materials that facilitate material recycling and that are marked in a uniform way so that they can be disposed of in an environmentally compatible way if material recycling is not feasible; and
- 3) “after disassembly, reusing parts in automobile manufacture or as spare parts or, for parts that can not be reused, recycling the materials back into the manufacture of new automobiles.

German automakers and related industries were quick to respond to government recycling proposals, forming the *Verband der Automobilindustrie* (abbreviated VDA, translated into English as “association of the automotive industry”) (Schenk, 1998). The early and now institutionalized cooperation among German-based automobile companies has had great implications for reactions to German, and eventually European Union, ELV legislation.

With this as the basis for discussion, the future of automobile legislation was debated throughout the early and mid 1990s and the final law titled the Ordinance on the Disposal of End of Life Vehicles and the Adjustment of Provisions under Road Traffic Law (*Altautoverordnung, Altauto V*) went into effect in 1998 working in combination with a voluntary pledge.³³ This law established the requirements for vehicle disposal, specifically regulating the removing of certain components and liquids and designating a percentage of the vehicle that must be reutilized. Not included in the final version of this legislation is specific/strict producer responsibility for the cost of disposal as was originally purposed by the BMU. Rather, what was agreed upon (in negotiations between the government and industry) is the “voluntary agreement regarding the environmentally compatible management of end-of-life vehicles (passenger cars) within the concept of the Ecocycle Act,” established in 1996. Termed the *Freiwillige Selbstverpflichtung* in German, the act encouraged voluntary measures of end-of-life vehicle disposal (Bleischwitz & Hennicke, 2004). The specific targets include:

- Improving recycling capability in construction
- Development, creation, and optimization of material cycles and re-utilization possibilities
- Improvement in the re-utilization advice given to automobile manufacturers
- Decreases in the waste from automobile disposal to 15 percent by 2002 and 5 percent by 2012 on average per automobile producer
- Qualified assurance of taking back free of charge ELVs not older than 12 years and under certain qualifying conditions

³³ From this point forward this act is referred to as the 1998 ELV Ordinance.

- Building-up of monitoring report system to control the devices (Lucas, 2001, p. 15)

It is important to note that these were targets rather than legislated mandates. This agreement, focused on improving the environmental impact of vehicle recycling, reducing the amount of ELV waste landfilled, and assuring that fluids were drained and properly disposed but in an industry driven manner (Bleischwitz & Hennicke, 2004). Without dictating specific targets that must be met, the government by default allowed industry to facilitate this “lean” voluntary management solution (de Clercq, 2002). Thus, resulting industry changes were ones of cost savings rather than environmental impact reduction.

Therefore, auto manufacturing companies played an important role in the shaping of this agreement, successfully negotiating voluntary standards to avoid recycling mandates (Nakajima & Vanderburg, 2005). Government officials and sixteen associations from across the automotive sectors (including dismantling and shredding) developed the agreement in the form of a voluntary, cooperative model. The first major victory for the industry was the allowance for involved parties (i.e. those in the automobile manufacturing and recycling industry) to decide for themselves how to reduce the amount of waste designated for the landfill at end-of-life. As a result the *Arbeitsgemeinschaft Altauto* (ARGE), a third party organization, was formed to oversee the implementation of this agreement. This provided flexibility in implementation as well as removed product liability for producers (Nakajima & Vanderburg, 2005).

Not legislating a fee for product take-back (paid by the industry to the government) was a second major victory for the automobile industry in the negotiation of

ELV disposal requirement (Bruijn, 2005). The majority of the burden for recycling in this legislation therefore falls to the dismantlers in the form of requirements for documentation of the environmental impacts of the disposal process along with the mandate to increasing reuse, recycling, and recovery activities beyond what was encouraged previously by only market forces (Bruijn, 2005).

De Clercq (2002) emphasizes several influences in this shaping of the end-of-life vehicle legislation. Most substantially, the auto industry in Germany is a rather homogenous group “with common interests and a powerful industry association who was able to fight off a stronger responsibility for car producers” (de Clercq, 2002, p. 107). The dismantling industry, conversely, was a heterogeneous group of companies without a strong organizational representation. The implications of this are visible in final legislation. As stated succinctly by de Clercq (2002, p. 108):

In sum, the automotive industry as a very homogenous, well organized and powerful actor, succeeded during the lengthy negotiations in anticipating and avoiding far reaching regulatory measures and the implementation of quantified goals as well as in shifting much of the responsibility towards other, less powerful, weakly organized and more heterogeneous actors.

As a result of these negotiations the *ELV-Ordinance of 4 July 1997*³⁴ stipulates the process of vehicle disposal. Specifically, the final owner must return the vehicle to a certified dismantler and deregister the automobile. Additionally, regulations for dismantlers are established requiring certification of environmentally friendly recycling processes by independent experts. The negotiation process for end-of-life vehicle

³⁴ From this point forward referred to as the 1998 ELV Ordinance.

disposal ended with the implementation of the 1998 ELV Ordinance, codifying the discussions and agreements of the previous eight years.³⁵

The results of the 1998 ELV Ordinance are difficult to determine being that it was only in place for three years, after which it was replaced by 2000/53/EC ELV Directive. As identified by Nakajima and Vanderburg (2005), not much is really known about benefits of German ELV Act implementation: “For a case so often cited, it is surprising that little concrete data exist as to its effects.” It is assumed that the implementation of the act did result in higher environmental standards for the dismantling industry as dismantlers were required to certify processes which required documentation of practices (Bruijn, 2005). Automakers did develop working relationships with dismantlers by “actively assists the car dismantler in modernizing its procedures by providing expert advice, insists on respecting environmental regulations and introduces new tools and equipment” according to some reports (Rhodes, Warren, & Carter, 2006, p. 211). The originally proposed goal of producer responsibility and increased recyclability in automotive design, though, became a “lost opportunity” in the focus on the end-of-pipe solution of regulating the dismantling industry rather than automakers (de Clercq, 2002, p. 107–8).

In 2000 the European Union adopted a version of vehicle recycling legislation as a response to the 1997 *Proposal for a Directive to Address the Environmental Impact of Vehicle Recycling and Recovery*, drawing heavily upon the German 2000/53/EC ELV

³⁵ It is more accurate to describe the negotiation process as occurring over ten years in the minister of the BMU approached BMW in the late 1980s to discuss the issue of vehicle recycling.

*Directive: European Union 2000/53/EC End of Life Vehicle (ELV) Directive.*³⁶ The motivation of the 1997 proposals were two: reducing end-of-life vehicle waste and increasing recycling and related processes at the time of vehicle disposal through the establishment of “clear targets to encourage reuse, recovery, and recycling” in the European Union (European Commission, 2000, p. 2). The directive specifically uses the policy tool of extended producer responsibility to meet these objectives.

The 2000/53/EC ELV Directive targets four specific end of life vehicle activities. First, when an owner determines that a vehicle has reached end-of-life, that person is responsible for transporting the vehicle to an authorized recycling facility. The final vehicle owner bears no responsibility for the cost of vehicle disposal. Second, producers must fund all costs associated with vehicle disposal. Third, producers should eliminate the use of hazardous substances (specifically lead, mercury, cadmium, and hexavalent chromium) and take actions to assure that these materials are not released into the environment at end-of-life. Finally, plastic recycling technology should be improved (the issues of this are previously noted) to increase the volume of plastics recycled. Further, the directive sets specific targets for waste management. First, by 2006 85% of a vehicle by weight, on a yearly average, should be recycled.³⁷ Second, by 2015, 95% of a vehicle by weight, on a yearly average, should be recycled. In this, 85% of the vehicle should be reused or recycled by vehicle weight.

³⁶ From this point forward referred to as the 2000/53/EC ELV Directive.

³⁷ These targets are specific to vehicles produced beginning in January 1980. Member states are given discretion in the writing of laws addressing the recycling of vehicles before this period with mandatory baselines of at least 75% for reuse and recovery and at least 70% for reuse and recycling.

One major difference between the 1998 ELV Ordinance and the 2000/53/EC ELV Directive is the exclusion of the option of counting “recovery” as a form of recycling by the European Union. Under the German law auto manufacturers were using the option of “recovery” (incinerate of material for energy production) to process automotive shredder residue (ASR) due to difficulty in recycling under current deconstruction practices. This is no longer allowed under the European Union legislation, which specifies that, the rate of *recycling* and *reuse* for each vehicle at end-of-life should be 85% by weight, on a yearly average by January 1, 2006 and 95% by weight, on a yearly average by January 1 2015. German automakers had hoped the use recovery to reach the elevated recycling rates of 95% as required in 2015 would be included in the 2000/53/EC ELV Directive.

Implementation of vehicle recycling policies is successful to date in the context of meeting legislated requirements. Germany reported exceeding the legislated recycling targets in the 2000/53/EC ELV Directive in both 2005 and 2006. In 2008 Germany reported a 89.2% rate for recovery and recycling by weight, on a yearly average and a 92.9% rate for re-use and recovery (BMU, 2011, p. 25). As mentioned in chapter one, these are the figures commonly used when analyzing the effectiveness of the 2000/53/EC ELV Directive. These figures do not, however, indicate what or if any design changes have been made to vehicles improving recyclability at end-of-life or other forms of “greening” in the production process. The figures only indicate the percentage of the vehicle recycled or recovered by weight. As discussed in chapter five, therefore, this question was asked to automakers during onsite interviews in the fall of 2010.

3.3. WASTE: DEFINING “PROBLEMS” AND “SOLUTIONS”

Finally, it is useful to end this chapter with the centering of waste disposal practices within the political. Gille (2007) recognizes wasting as “political” in that through the defining of political objectives, governments reveal environmental and economic priorities. The creation of national level waste disposal priorities, and the designating of waste/ing as a “problem” is a fairly new development. Before the 1970s most Western countries did not have extensive legal frameworks to manage waste. Practices of disposal, therefore, occurred mostly outside of government regulation.

An interesting result of this for the vehicle recycling industry is the development of recycling practices without government motivation or initiation. This “green” industry (green in that focused on materials reuse and in way describing what has been referenced by many as the improper disposal of hazardous fluids) operated because of profitability. As is discussed further in chapter five, before the designation of the 2000/53/EC ELV Directive, vehicles were never defined as a “waste product” by the auto manufacturing industry or the deconstruction/recycling/scraping industry. It is only with the passage of this legislation that this designation was created. It is, as Fagan notes, “In Foucauldian terms – without definition, without naming, without statistical information – its [wastes] regulation was simply socially impossible” (Fagan, 2003, p. 69). And with this keeping of statistics that “problems” of vehicle recycling could be illustrated and the “problem” of vehicle disposal defined.

Further identified by Gille (2007), waste priorities, designated by the state, represent power relations among and between various groups of actors such as the government, industry, citizens, and advocacy organizations. The United States Supreme Court, for example, has defined garbage transfer as a form of commerce (*City of*

Philadelphia v. New Jersey), requiring states to receive garbage shipped interstate due to the Commerce Clause, thus identifying waste as a commodity (de Kadt, 1999; Thomson, 2009). This legal ruling impacts not only trade relations, but also the problematization of disposal in the form of the waste commodity. In the example of Germany, as the previous discussion identifies, the development of the German ELV Act was greatly affected by the different relations of power in the negotiation process among those who were regulated, namely the automakers and the auto recyclers. The powerful automaker lobby assured that the responsibility for disposal was placed squarely with the vehicle recyclers, promising to aid in the development of deconstruction and recycling technology. The power of the automaker lobby relative to the European Union, though, proved to be not as strong as it was in relation to the German government. As a result the 2000/53/EC ELV Directive places a majority of the legislated burden on the automakers rather than the recyclers. This responsibility is defused in the German case, however, in the state level codification of the 2000/53/EC ELV Directive. A more complete discussion of this difference is found in the next chapter.

Moreover, government policies can, and some argue must, play a substantial role in influencing the incorporation of policies such as extended producer responsibility (Ueta, 2004). Unless producers are forced to internalize externalities such as waste production, they will continue to leave the responsibility of management to the government. A major component of extended producer responsibility is the idea that it promotes innovation in product design because producers have motivation to create “greener” products. This requires the political, but it must be noted that the political is framed by the economic. In the following chapters the importance of the political

underlies the discussion of vehicle recycling policies and practices when creating an economic understanding of the operation of extended producer responsibility in practice. Chapter four develops a meso-level analysis specifically for this purpose that is then applied in chapter five to the 2000/53/EC ELV Directive. In the next two chapters, therefore, the economic relations of production, and their implications for the implementation of policies of extended producer responsibility, in this case the of the 2000/53/EC ELV Directive in Germany, are used to further illustrate the positioning of production in success of these policies.

Chapter Four

MESO-LEVEL ANALYSIS: CREATING A THEORETICAL FRAMEWORK

4.0. INTRODUCTION

While the management of wasting begins with micro practices (the individual identifies an object as waste and then elects to respond in some forms of management), how the act of wasting occurs is dependent upon macro economic and political structures (the collective of the state, society, the global economy, and/or world systems). Building upon the social theory literature review provided in chapter two, this chapter begins by identifying the importance of the unification of the micro and the macro in understanding the object of waste. The critique of the micro/macro dichotomy is described most completely by Gille (2007, 2010). While Gille provides a preliminary focus for the understanding of the need to move beyond the micro/macro dichotomy in waste research grounded in an understanding of society, this chapter moves away from her framework instead offering an understanding of waste grounded in production, while continuing to stress the importance of a focus on materiality.

Though waste is typically considered a result and thus a problem of consumption as previously introduced, I argue, building upon the social theory literature outlined in chapter two and following along eco-Marxist critiques of those such as Foster (2010) and O'Connor (1991a, 1998; 1994) outlined in this chapter, that waste is a necessary component of production. Therefore understandings of the “problems of” and “solutions to” waste must be framed within an analysis of the operation of production within the

economy. Waste management policies focusing on the production process, such as extended producer responsibility, may therefore be able to effect waste generation and disposal with tangible outcomes.

This chapter creates a meso-level waste analysis in an attempt to connect the micro to the macro without losing the materiality of waste. This analysis provides a more comprehensive understanding of the relationship among power and production than is currently found in the waste/ing literature. Using the theoretical framework created in this chapter of meso-level waste analysis, chapter five applies these concepts to the example of extended producer responsibility policies regulating vehicle recycling, specifically the 2000/53/EC ELV Directive as it is implemented in Germany. This chapter therefore provides the basis in which to situate the meso-level as the mode of analysis within larger economic and political structures.

4.1. MATERIAL BASIS FOR THE MICRO/MACRO SYNTHESIS

4.1.1. The materiality of waste

The materiality of waste is a neglected component in most waste scholarship. While waste is an actual object, in most research the “*stuff* of waste” is ignored³⁸ for a focus on abstracted metrics and measures of materials management in the context of various forms of treatments (Gregson & Crang, 2010).³⁹ This research tends to focus on

³⁸ The reasons for this disregard are explored in chapter two in the social positioning introduced in the anthropology literature.

³⁹ Recently this focus of the research has become a topic of discussion, and rightly so. Volume 42 of *Environment and Planning A* is devoted to this conversation introduced in a guest editorial by Nicky Gregson and Mike Crang. The editors conclude “Collectively, then, the papers gathered here show not just that materiality matters to the development of waste scholarship, but that a focus on industrial waste matters to the development of work on materiality” an element that is missing in growing body of waste literature

relationships that “sustain and organize wastes as wastes” neglecting to question these assumed categories and understandings (O’Brien, 1999, p. 269). While detailed in its analysis of policy prescriptions this type of scholarship fails to ask why objects become waste or consider the relationships that result from the materiality of objects. As waste is socially defined and constructed, this method of analysis offers limited space for a critical understanding of why wastes are produced initially and thus how they should be managed.⁴⁰

More specifically, Gregson and Crang (2010) describe how a lack of consideration of the materiality of waste has resulted in siloed reactions in waste-focused research. Thus, social science research focuses on policy and planning for waste management and engineering research concentrates on the technical aspects of waste treatment. A materialist perspective is important to circumvent this simplified form of analysis that too often results in “that which is managed as waste is waste, and that which is waste is what is managed” (Gregson & Crang, 2010, p. 1026). A materialist perspective also supports understanding the economic value of waste, an important component of the wasting process and motivation for its management. This value may be positive (as with metals and segregated types of paper) or negative (as with hazardous waste that requires specific forms of treatment for disposal). As identified by O’Brien (1999, p. 279) “Waste management is precisely the political economic activity that

(Gregson & Crang, 2010, p. 1031). The same notion can be applied to municipal waste literature as well.

⁴⁰ Pointing out the problematic nature of the micro/macro dichotomy is not limited only to waste literature. Reid et al (2009) recognize the inability to gain a full understanding of pro-environmental behavior by only looking at one level or the other. Further critiques of this dichotomy outside of the waste literature are identified by authors also using meso level analysis as a remedy to this failure as described further in section 5.4.

demonstrates this beyond a doubt: ‘waste’ does not go away,” a point also made by Gregson et al. (2010). Waste is material and this materiality has important implications.

Although for the most part neglected, there are examples of waste research focusing on materiality that provides models for more robust understandings. Gregson et al. (2010) uses the management of asbestos to illustrate materiality in this way⁴¹. Instead of focusing on “frameworks of risk and governance” categorized as hazardous, Gregson et al (2010) acknowledges the material properties of asbestos, emphasizing that this material, regardless of the course of treatment, will continue to exist in a form dangerous to humans. Asbestos is a physical substance that follows the second law of thermodynamics and can neither be created nor destroyed but only transformed: the harm that this material causes, no matter how it is transformed, illustrates how this tangible material never “goes away” (Gregson et al., 2010, p. 1067). This materiality has the possibility of dire health consequences, elevating the importance of its composition.

Gregson and Crag (2010) describe another example of the materiality of waste found in Guy Hawkin’s work *The Ethics of Waste: How We Relate to Rubbish*. The second chapter of the book describes a common item of disposal (both proper and improper – i.e. litter) and icon of a “disposable society:” the plastic bag. In this chapter the “emphasis [is] on the materiality of waste and how it is part of a sociotechnical complex – not an asocial material remainder, nor simple social convention” (Gregson & Crag, 2010, p. 1028). This is an important movement forward in understanding the materiality of waste. It is here that Hawkins uses examples of how micro-level practices

⁴¹ Gregson et al (2010) draw heavily on the work of Ingold (2007) who provides a critique of materiality research in that most fails to address the tangible, ever present properties of objects.

can be disruptive to the macro-level system, illustrating the importance of the *object* in this disruption. Her chapter on the plastic bag therefore describes how the structure of the commodity, the object, a bag, shapes and forms the economic, the political, and the social. She focuses on the structure of the commodity form to understand fetishism of the product. In this, she is identifying how through governmentality, one's subjectivity is coerced by "state programs and structural transformations in domestic waste services" (2010). Tying practices and formations of subjectivity to interactions with the object adds in this example the materiality of the commodity not evident in most literature, and enhances the ability to understand the role of the material within larger relations. This subjectivity can be related to the lack of sovereignty of the consumer participating in larger relations of oppression through the economic system of production as described by Marcuse (1991), Baudrillard (1981b), and Lefebvre (1984) and emphasized in chapter two.

Gille (2007, 2010) also attempts, explicitly, to make this connection to materiality through the identification and critique of the use of the micro or the macro as level of analysis in waste research. As identified by Gille, this dichotomy is a defining characteristic of the academic discourse. Authors tend to utilize only one of two levels of analysis for study: micro actions (tied to the object/materiality) *or* macro movement. Gille (2010) is one of the few authors who provides a comprehensive critique of the micro/macro dichotomy emphasizing why using only one level of analysis does not give a full picture of the positioning of waste within social relations. To do this Gille uses a combination of Marxian analysis and actor-network theory. Where my work differs from that of Gille, though, is that in using a broader definition of rationality in the production

process allows for an understanding of waste centered within production. Marxian analysis itself therefore provides a basis for examination of the micro, the macro, and the linkages between the two grounded in materiality of objects.

4.1.2. The micro-macro dichotomy

It is easy to imagine the positioning of waste on the micro-level. Throwing away items into a trashcan, recycling bin, or compost pile are actions that most people take on a daily basis. At the very root of many of our individual activities is the seemingly controllable (in that you as the individual make the decision unmediated by the larger economic structure) separation of material into categories of that which is wanted and that which is not as described by Douglas (1984) or Scanlan (2005). Micro research in general focuses on observations of these designation practices especially in the household relating to consumer waste.

Several topics of literature are related to micro forms of analysis. One overall theme is that of thrift. Acts of thrift are engaged in by the individual and may be related to necessity and/or morality. Both converge in writings detailing salvaging efforts during World War II. Emphasized by the government as an act of patriotism (posters of the time called for citizens to “put a lid on Hitler” – i.e. the act of throwing something away is viewed as wasteful in the context of national material collection and rationing programs), diversion of waste was also an act of necessity due to wartime restrictions on production and consumption (Cooper, 2009). Since the 1990s a sizeable body of literature has developed focusing on individual steps that can be taken to “save” the earth such as buying recycled products, backyard composting, and utilizing reusable bags at the grocery store (Luke, 1997). Here thrift is framed within the context of morality. This

literature focuses on the psychological connection people have with materials related to practices of disposal (Hetherington, 2004), as well as household recycling as a form of individual ecological citizenship and related ethical considerations (Hawkins, 2006). The DIY (do it yourself) discourse emerging out of the economic crisis of 2008 further emphasizes practices of thrift. In this instance the motivation is personal economic savings rather than, or perhaps as, morality.

Other streams of micro-level literature focus on sensationalizing perversions. In recent years the concept of hoarding, popularized by television shows such as *Hoarders* on A&E in the United States focusing not only on the inability of individuals to throw or give away items but also interventions as an attempt to modify this potentially physical and psychologically unhealthy activity. Hoarding research places a hyper-emphasis on the role of the individual in waste management. Though hoarders compose a small subset of the population this phenomena is important to note because of the added emphasis of the shocking nature of the television show and the resulting ability to shape public perceptions of the role of the individual in waste management through extreme attachment to items (Cherrier & Ponnor, 2010). The television show illustrates what happens when disposal is not the immediate next step in the lifecycle of an object. Emphasized in this is the person who wants what others do not want – the discards of everyday life.

For items of disposal from the household, waste/ing is an individual/micro processes through which one determines the distinction between the private and the public as previously described with in the work of O'Brien (1999). In this same way

Chappells and Shove (1999, p. 268) describe the household waste receptacle⁴² as “the gateway between domestic waste arrangements and systems of public provision.” It is a black box in which to insert the things you never want to see again. It is the last contact the individual typically has with personal waste. Once waste is placed in the box it “exits the private world of the household and enters the public domain” (Chappells & Shove, 1999, p. 269). This exodus is physical and psychological – the person no longer thinks about the waste specifically or the process of waste/ing generally. This focus on individualization of waste creation and the resulting connection of personal responsibility rather than understanding of greater economic and political arrangement frames the limited public and academic understanding of the function of waste within society (the macro). De Coverly et al. (2008, p. 289) describe this idea as the “social avoidance of waste” – waste is removed so quickly that that it “essentially relieves us from any further responsibility” – more bluntly creating this disconnection understanding the relationship between the waste you create and the larger system of production in which your relations operate. People spend very little time with waste, and disposal is as easy as rolling a trash can to the curb. Once the can is placed outside it is no longer necessary for a person to “think” about waste. It is easier to purchase more products then attempt to fix what is broken, and to the garbage material goes. Management is quick and simple. This distinction pulls apart the micro from the macro, furthering the separation the two.

The separation of the micro and macro in the positioning of waste does effect conceptions of waste and thus strategies for waste management. de Kadt (1999) critiques this individualization of waste – the focus of micro studies. He states that “as long as

⁴² Waste receptacles defined as garbage can, recycling container, compost bin and the like.

waste is depicted as a household problem it need not be seen as a direct product of the production system itself hiding the fact that it is” (1999, p. 148). This is continued by the individual responsibility required for waste management in most areas, for example, recycling collection programs frequently rely on free labor provided by citizens in the cleaning and sorting of materials in the home (Gille, 2010). Focusing on the micro also frames waste studies through consumer and household waste (Gille, 2010, p. 1050). This lens excludes both industrial waste (a majority of the overall waste stream) and the understanding of how materials become objects of disposal (before consumption). Micro-studies therefore focus on the consumer and consumption, ignoring any steps in the production and distribution process before item purchase that have already determined how and when products will be disposed.

Macro studies, conversely, focus on broader categorizations such as the relationship between specific forms of hazardous waste and environmental risk, the transfer of waste to sites of disposal, and the politics of disposal on the regional or national level (Gille, 2010). These general descriptions trace broad movements of waste rather than examining the actual materiality of waste as we see with studies rooted in objects, usually singularly, on the individual level. At the same time macro-level analysis tends to place waste within “well-rehearsed social science concepts, effectively ‘hyphenating’ them:” waste-flows, waste-regimes, waste-governance, waste-citizenship (Gille, 2010, p. 1050). These broad categories attach waste to already developed concepts, assuming a smooth transition and interchangeable application. They discourage the questioning of these themes and assume that waste acts, under certain circumstances, like every other object, action, or activity.

On the macro-level analysis loses the materiality of the actual object. One way this occurs is in the documenting of how waste becomes a form of governance as institutions unite to oversee its management (Chilvers & Burgess, 2008). It is here that waste literature identifies the relationship between industry and the government. The government imposes waste management practices on corporations such as requirements to process/contain hazardous waste, dictating products that cannot be used in the production process (asbestos for example), or more recently requiring corporations to manage products at the time of disposal (extended producer responsibility). This literature also focuses on policy prescriptions and the analysis of specific technologies of recycling rather than the physicality of the material.

The macro-level of analysis focuses upon generalities of waste and wasting in such a broad manner that Gille describes it as lacking “empirical thickness” (Gille, 2010, p. 1050). In using only a macro frame of reference researchers fail to contextualize waste in the *material* (physical form) while simultaneously describing its existence in abstract relations. This material, the waste *stream*, is tangible but absent in macro studies.

4.1.3. Combining the micro and the macro

The either/or designation of the process of waste/ing as micro or macro is inherently limiting. By either looking at the individual level or the abstract macro-level it is easy to lose sight of relations of production and material impacts of the object that reinforces actions and implications of waste/ing. As Fagan (2003, p. 72) acknowledges, “the consumption pattern of the household results in the waste bin as we know it, albeit one that could be very different if the forces of production were regulated to produce commodities that were truly of less negative impact on the environment.” Examination at

the micro-level neglects the larger economic and political framework that determines what is to be “wasted” and limits individual decisions as to only its management. However, through the utilization of the micro as a conduit for the examining the macro it is possible to assess the relationship between an object and broader notions of wasting and thus the relationship among environmental degradation and economic and political interactions. Analysis of the micro can also serve as a conduit for illustrating the understanding of the macro. People encounter and make decisions about the management of waste on the individual level every day. Everyone must manage waste, and in this people become quite attached to the idea of its management through routines and rituals (Douglas, 1984). Inserting the material and the micro into macro discussions can contextualize broad, abstract concepts.

Gille (2010) attempts to remedy these failures in the research through a combination of analysis using the Marxist mode of production⁴³ and actor-network theory.⁴⁴ To avoid the division of the micro/macro dichotomy she focus on *levels of abstraction* in the shift from abstract to concrete (emphasizing the role of concrete material agency in actor-network theory). Gille uses this method she terms “waste regimes” as an attempt to examine waste as “produced” in its material form but also as located in the larger system of production within the context of economic, social, and cultural forces and relations. As discussed in the following section, though, Gille’s method is inherently problematic. This dissertation, instead by focusing on the position of

⁴³ Drawing especially upon Foster’s (2000) dialectical materialism and metabolic rift.

⁴⁴ Following generally from the work of Castree (2002), Gareau (2005), and Rudy (2005).

production and on power and the political, provides a fuller understanding of the necessity of waste in capitalism.

4.2. SYNTHESIZING THE MICRO AND THE MACRO: GILLE’S WASTE REGIMES

Gille’s (2010) work is an attempt to remedy the problematic macro/micro dichotomy. She argues that we need to return to a macro-level theorization of the waste-society relationship while maintaining a material and historical understanding of how things become waste, acknowledging the materiality of waste (micro-level).⁴⁵ Gille (2010, p. 1050–1) does this through what she has termed a “macrotheoretical framework of the waste – society relationship.” In this she combines two theories often considered (though not always) at conflict with each other: actor-network theory (ANT) and Marxian analysis.⁴⁶

Gille begins her theoretical discussion with a posthumanist perspective of waste grounded in ANT. She identifies waste as a hybrid of both the human and the non-human, arguing that in this hybridity the material/materiality of waste *cannot* be separated from the social. There is in fact no purely existing social, objects and relations are “overlapping and interconnecting,” inseparable from each other (Gille, 2010, p. 1051). To understand the role and function of this hybrid it is important to understand how and why waste exists. This existence cannot be based, though, in “modes of production, or capitalism and socialism as reified abstractions” because the ANT model assumes that since there is no purely social this categorization is impossible (Gille, 2010, p. 1051).

⁴⁵ Gille (2010) argues that the materiality of waste is most obvious in micro-level studies.

⁴⁶ Notable attempts have been made to combine or at least smooth out the inconsistencies of joint application of actor-network theory and Marxian analysis. See for example Castree (2002), Gareau (2005), and Rudy (2005).

ANT is a broad theory with many distinct strains of thought. Gille (2010) thus critiques Latour's (2005) concept of the "flattened landscape" in that it does not allow for a macro-level analysis but rather only micro, decentralized connections. Instead she focuses on Pickering's (1995) "dance of agency" in which waste is both human and non-human because the designation of waste is socially constructed. Without the social, the material does not exist; therefore it is impossible to make a distinction between the two. Rather, what is important is the pull back and forth between the human and non-human. From this one can find a focus of micro-level analysis encompassing the actual materiality of waste that allows for an opening into the macro-level rather than wholly excluding it as does Latour's interpretation of ANT (Gille, 2010).

To place waste/ing within larger social structures, positioning the micro within the macro, Gille (2010) uses Marxian analysis. While critical of previous attempts to combine the two, she supports this connection within the spirit of ANT by acknowledging that abandoning the macro-level (in the "flattened landscape") does not fit the "logical ambitions of ANT" (Gille, 2010, p. 1053). Marxian analysis is therefore a way to recognize both that the macro is important as well as that it is distinct from the micro. Where Gille moves away from Marxian analysis is in rejecting the positioning of production as central in understanding waste. Waste regimes are therefore Gille's answer to the problems associated with the use of ANT and Marxian analysis separately. Thus Gille establishes a macro-level analysis that is concerned with the (micro) materiality of waste.

4.3. MICRO/MACRO ANALYSIS AND THE POLITICAL

4.3.1. The problem of production

A synthesis of the macro and micro that contains an understanding of the importance of materiality, however, may be interpreted quite differently from waste regimes as described by Gille when located within the context of the economic and the political. Specifically, by countering Gille's conception of production with one that is more broadly defined it is possible to connect the micro to the macro while grounded in materiality, through Marxian analysis, as well as illustrate the role of the political in understanding these relations. To make this claim, though, we must first question Gille's rejection of a Marxian focus on production.

The micro/macro dichotomy and the grounding of waste research within an acknowledgement of materiality emphasizes two neglected foci in waste studies and policy research: the relationship between waste and production and the acknowledgement of waste as a commodity with value. As stated by Gille (2010, p. 1050):

The problem with splitting waste into the categories of producer waste and consumer waste in the literature is that this reinforces the false assumption that consumers in Western capitalist societies make garbage, when in fact neither do they make trash materially nor do they have much choice in what materials they buy and thus turn into surplus stuff.

Gille in this statement acknowledges the macro relations of production and the role it plays in micro actions, supporting the importance of the need for a micro/macro synthesis. Gille uses Marxian analysis in the waste regimes theory to connect the micro to the macro. She does not, however, do so in the context of production for the understanding of macro level activities. Rather Gille critiques Castree's (2002) attempt to synthesize Marxism and ANT because he begins with "production and realization of waste" (2010, p. 1054). In this Gille presumes a specific form of rationality in the

production process. She describes this in the preceding paragraph as one of mainstream economic accounting. In this limited/ing understanding Gille (2010, p. 1054) states that:

[That] the economy is constituted by the production and exchange of intended things reflects the arrogance which ANT so rightly criticizes as the modernist myth: that through rational action, human and social intentions are fully realizable and nature, human bodies, and materials can be molded to our liking given the right science and technology.

Gille rejects a macro economic argument based in production because it assumes that the production process (and players in that process such as humans and institutions) are rational. What may be disputed here, though, is her idea of rationality. Gille assumes rationality of the market can only be described in a “mainstream economic” or classical economic sense. In this the market “works” because rational actors have full knowledge of actions and options and therefore make rational decisions.

Marcuse (2001, p. 158), following Marx, describes a more complex notion of rationality in economic action referring to the “insane rationality of the whole.” In this Marcuse (2001, p. 158) identifies that rather than a transparent rationality there exists a “technological and ideological veil which conceals what is going on.” This veil covers the “insane rationality of the whole.” An understanding that the macro actions of production and the micro actions of fetishism are working to conceal operations that are “rational” only in a perverse sense, thus, challenges Gille’s notion of rationality.

Rationality, in the context of the economic,⁴⁷ should be understood as more than simply classical production. A form of “rationality” might make sense in an abstracted economic model but not for the human in everyday life. In rejecting the starting point of production, and with a focus on society rather than power, Gille therefore develops an

⁴⁷ Here Gille is specifically describing economics in the context of today’s structure of capitalism.

incomplete idea of the role of value in waste. In grounding a political analysis at the point of production, an argument that can be made that considering a broader definition of rationality results in a very form of analysis.

4.3.2. Waste and value

Gille also critiques Marxian analysis for an absence of a holistic understanding of waste and value. Waste, she argues, will always be a “theoretical by-product” in Marxian analysis because of the lack of application of socially necessary labor time and thus value. Waste, therefore, is theorized as a byproduct or inefficiency. Gille (2010, p. 1050) uses a version of Gorlay’s (1992) definition of waste as “any material we have failed to use.” In this she focuses on the absence of value in use or exchange of some materials (i.e. wastes) rather than the potential for value in other relations. This definition, though is limiting in that it opens a vague definition of “use” and of “failure.” The considerations of both of these are unclear.

While this is one economic method for proposing the value of waste, I reject this categorization is the only, or best, understanding of waste within a Marxian framework. Waste is more than a byproduct or inefficiency; waste is a necessary component of capitalism as illustrated by the second contradiction.⁴⁸ As stated by Rudy (1994, p. 104) “capital constrains nature because capital enables capital” – capitalism requires an intensification of production and this necessitates and necessarily creates an intensification of environmental impact. As waste is today fully commodified in Western nations it is now a necessary component of production processes and possesses its own value. This role of waste is an example of capitalism remedying constraints and forming

⁴⁸ Waste as a requirement of capitalism as illustrated by the second contradiction is emphasized and explained in the next section.

new ecologies and relations to these new arrangements (Rudy, 1994). Or as stated by Ray (1993, p. 100) “capital not only has a tendency to expand but also the capability to restructure itself, if necessary, to prepare the objective conditions favorable for its existence, i.e., control over production and consumption and hence growth.” Therefore because capital is adaptive waste can no longer be considered simply a byproduct.

Unlike Gille, I argue that in developed countries waste is never truly value-less. Like Thompson (1979, p. 10), I contend that value does not disappear from waste but rather, when unrealized, the material is in a “timeless and valueless limbo” from which value can be later discovered. Waste is always eventually valued and will always return from the limbo. Waste is a positive resource in that it always has the potential for reuse, reprocessing, and reapplication rooted in its materiality. This can occur in one of two ways.

First, markets do exist for the recycling of certain types of materials. These materials have what can be termed embedded values. Although some materials may end up in the garbage stream, these objects nonetheless possess value. An example of this is an aluminum beverage container. Aluminum cans contain what is termed “embedded energy.” It is less expensive (and less harmful on the environment – an important factor if government regulations declare it important) to remanufacture a new aluminum can from an old one than to manufacture an aluminum can from virgin material. Bauxite mining is expensive and requires massive amounts of energy to transform the necessary raw materials into an aluminum can. For this reason aluminum markets exist, and one can sell this form of waste (future recyclable material) for money. Another example of this is the use of cooking oil to create biodiesel. Originally a waste product, corporations will now

pay producers of this material for the right to remove it from a premise and thus process it into a new product. The newly developing biodiesel fuel market has given a new value to what was once considered a waste product.

Second, in industrial societies value is always placed on waste by the government. If waste is not collected through private markets (such as those for recycling and reuse) the government will place a value on it for removal purposes. The commodification of waste is necessary to assure human and public health; the slow or improper removal of waste is a threat to public safety and the environment. The government therefore attaches a value to waste and its removal. This commodification of waste has led to the creation of the multi-billion dollar global waste industry.⁴⁹

4.4. ECOLOGICAL MARXISM AND WASTE: MATERIALISM AND THE MICRO/MACRO ANALYSIS

4.4.1. Marxian analysis and the micro/macro dichotomy

Marxian analysis can be used to overcome the divisions of the macro/micro dichotomy of waste/ing in providing a basis for an understanding of the relationship between waste and production illustrated through the emphasis upon waste as a commodity. This commodity is one of value, creating relationships that when clarified offer an understanding of the necessary positioning of waste in capitalism and therefore how waste policies conform to and support this need. The “second contradiction of capitalism”⁵⁰ inherently connects the commodity, a tangible material, to production, even when abstracted, on the macro-level. The understanding of the value of the commodity

⁴⁹ These two concepts of waste and value are further illustrated in section four. They are initially described here to offer a critique of Gille’s conception of waste regimes and the value (or lack thereof) of waste.

⁵⁰ As identified by James O’Connor (1991a, 1998).

further strengthens the understanding of waste as a tangible material and illustrates its physical relation in the production, consumption, and disposal process.

To identify how each of these is appropriate for understanding the material and bridging the macro/micro dichotomy we must first begin with an economic analysis to explore the historical material conditions that shaped our actions towards waste/ing today. I begin by providing a basis for waste in the process of production. After creating this foundation I address the importance of the commodity in understanding the relations between waste and production.

It is important to acknowledge that Marx himself uses both micro and macro positioning and examples in his work *Capital*. While this text contains an overall examination of economic relations of capitalism, it also includes micro-level understandings, examples, and analysis with the hope of yielding the same results (Cawthorne, 2001). These examples of the circulation of the economic relations surrounding bibles, wheat, diamonds and the like made by Marx (1990) tie the materiality of the object and its micro-level relations to macro analysis.

4.4.2. Production and the metabolic rift

The basis of ecological Marxist analysis is rooted in Marx's (1990) description of the metabolic rift. This "rift" is a disconnection between humans and nature. The metabolic rift is caused by the failure to recycle material back into nature (or the physical environment) from where originally obtained, and the resulting/related environmental degradation. Marx (1990) uses the example of agriculture and urbanization to illustrate this separation. Industrialization of agriculture allowed (or forced) people to migrate to

the city to participate in newly organized forms of labor (factory work). With less labor needed for farm purposes, people were freed from ties to agricultural land.

Movement to the city, however, removes people from the land and removes resources from extraction locations adding a geographic/spatial element to the production and distribution of products. Products are no longer used where they are produced and therefore can no longer (easily and quickly) be recycled back into the nature from which they originate. Production and disposal become more complicated; supply chains of distribution begin to form, at first in short steps, and eventually into a long, globalized process.

During this time of initial spatial change there was also dramatic shift in the technology of the production process facilitating, encouraging, and allowing for production for exchange. As Luke (1990) notes referring to Engel's 1935 work *Socialism: Utopian and Scientific* (p. 54),

The materialist conception of history starts from the proposition that the production of the means to support human life and, next to production, the exchange of things produced, is the basis of all social structures; that in every society that has appeared in history, the manner in which wealth is distributed and society is divided into classes or orders is dependent upon what is produced, how it is produced, and how the products are exchanged.

Production also structures social relations; changes in production result in changes in social relations. While production is often described in the abstract or on the macro-level, it is important to note that production is the processing of physical materials. The acknowledgement of materiality is quite important in a Marxist analysis of waste in that the commodity provides a "vehicle for the systemic internalization of capitalist production conditions" (O'Brien, 1999, p. 272). At a fundamental level, Marxist analysis is grounded in materialism. To Marx, "material circumstances" are *both* social and

natural (the environment) (Foster, Clark, & York, 2010). Production is therefore limited, shaped, and defined by the materiality of nature. This creation of the commodity implies a base, and this materiality is fundamental to the process: “No production [is] possible without an instrument of production, even if this instrument is only the hand” (Marx, 1973, p. 85). Examination of the actual object or commodity, the result of the production process, understood within greater economic and political conditions, can enhance the illustration of and add tangibility to the positioning of waste in the process of production. By understanding this positioning we can assess the categorization of waste “problems” and waste “solutions.” Chapter five is an attempt to do just this in the context of the 2000/53/EC ELV Directive.

4.4.3. Waste and the “second contradiction of capitalism”

The “second contradiction of capitalism” is an ecological Marxist theory first posited by James O’Connor (1991a; 1994; 1998). O’Connor, in his work, identifies a path for understanding environmental degradation through the work of Marx, acknowledging that while Marx did not specifically draw ecological conclusions of the contradictions of capitalism, the logic created by Marx is a foundation from which these can be drawn (1998).

Marx’s (first) contradiction of capitalism is the contradiction between capital and labor. In this contradiction three factors of demand in capitalism can cause crisis: “natural conditions” such as poor crop yields, “general barriers” inherent to the production process, and actions in that “capital undervalues nature” (O’Connor, 1998, p. 159-69). These contradictions eventually lead to overproduction that then must be corrected, initially through crisis. Where O’Connor (1998, p. 160) advances this theory is in the

observation that that “natural” barriers are not only intrinsic to natural processes such as droughts but also may but may be produced and reproduced through capitalism itself: the production of a “ ‘second’ capitalized nature.”

In traditional Marxist theory the crisis of capitalism is one of the overproduction of capital and the need to constantly find uses of this expansion. In crisis, capitalism is reorganized to more efficiently exploit labor and reorganize production processes for efficiency. This often takes place in conjunction with the state, reorganizing capital for more control over production. Ecological Marxism, through the second contradiction of capitalism, focuses on the underproduction of capital – the reaction to crisis as a need to make management of nature and resources more efficient or productive. What is in conflict here is the “capitalist production relations and productive forces, on the one hand, and conditions of production, on the other” (J. O’Connor, 1998, p. 164).

Capitalism inherently reacts to and maintains itself in crisis through changes in the conditions of production in two ways. First, it reorganizes productive forces with the goal of efficiency. An environmentally situated result, for example, is the lowering of the price of raw materials. This in turn creates the foundation for another crisis as increased material use leads to decreased material availability and eventually scarcity. This reaction also results in cooperation. In his book *Natural Causes: Essays in ecological Marxism* James O’Connor (1998) uses the example of integrated pest management (IPM) and the cooperation between framers and educators necessary to implement this “solution.”

Integrated pest management is a pest control method that requires many groups to work together to prevent pest damage to buildings, crops, and/or human health. The management system is complex and requires multiple actors to conform to practices with

the goal of reaching a completely controlled system. Integrated pest management is a reorganization of activity that requires related groups to conform to an efficiency goal as a response to crisis.

The second way capitalism reacts to the underproduction crisis is through “exercising more control of production conditions, that is, more planning” (J. O’Connor, 1998, p. 168). As O’Connor says succinctly “crisis forcibly causes capital and state to exercise more control or planning over production conditions” (1998, p. 168). This is not socialism or necessarily a signal of the movement towards socialism but rather the partnership of capital and the government to lubricate the maintenance and expansion of the system of production.⁵¹ The state acts in the interest of capital rather than the society or the environment. In this state actions support the needs of capitalism, the continuation and expansion of the system of production, rather than social goods such as better work environments or ecological benefits of reduced pollution production. These actions may (or may not) be masked as attempts to benefit the social or environmental, unconsciously or consciously. This dissertation seeks to illustrate how government policies focusing on production conditions operate within and in conjunction with capitalism specifically in the realm of waste management strategies in the implementation of the 2000/53/EC ELV Directive in Germany.

4.4.4. Capitalism and continued degradation: the role of production

Foster (2010, p. 207), in reference to O’Connor (1991a) terms the second contradiction “the absolute general law of environmental degradation under capitalism.” The first contradiction of capitalism is thus “the absolute general law of capitalist

⁵¹ Although O’Connor does note that this response makes the idea and form of socialism more “imaginable” (1998, p. 169)

accumulation” (Foster et al., 2010, p. 207). Capitalism requires continued and increasing rates of exploitation for the accumulation of wealth. This further stratifies class relations, exaggerating the gap between the wealthy and the poor, or capitalists and labor. The continued expansion of capitalism also requires physical expansion across the globe, incorporating more and more labor and capital under this framework.

It is in the second contradiction that the finite resources of nature provide limitation and therefore a platform for crisis. Growth of capitalism concentrates environmental harm generally not only at the location of labor (the poor), it also requires the continued growth of these harms (as wealth grows). Thus, as capitalism expands so does environmental degradation. Since capitalism must expand to avoid collapse, environmental degradation must also continue to expand. This concentration of harms, and exploitation of the environment, does not necessarily happen at the same pace (Ravaioli, 1993). It is for this reason that overuse of resources does not automatically lead to immediate ecosystem collapse. Environmental harm can go unnoticed, under noticed, or unrealized for long periods of times.⁵²

Environmental degradation is further supported through production dependency on heavily pollution technologies such as fossil fuels, pesticides, and petro-chemicals, magnifying environmental harms/effects rather than mediating them (Foster, 2010, p. 208). In the short-term these technologies increase efficiency in production. Overtime they continue to accelerate environmental damage and destruction, resulting eventually in underproduction as described by O’Connor (1998). Even technologies such as recycling,

⁵² Degradation in this context is not limited to resource depletion for production purposes. It also encompasses the sinking of pollution into the environment such as carbon dioxide and other global warming gasses. Global warming is an example of how harm can be maintained for an extended period of time before ecosystem collapse.

designed to decrease environmental damage, continue to feed this growing (short-term) need of increasing production by efficiently providing feedstock for the expansion of manufacturing activities.

Therefore we can conclude that although consumption is often identified as the root of environmental problems, it is actually the maintaining of this system of production to support growth in capitalism where damage is rooted. The (appropriate) locating of environmental harms within production opens a space for the connection of the materiality of the commodity to micro relations of production. As emphasized by Marx (1973, p. 408), maintaining the production system *requires* increased consumption: “firstly, [though] quantitative expansion of existing consumption; secondly: creation of new needs by propagating existing ones in a wide circle; thirdly: production of needs and the discovery of new values.” It is in this that we can inherently tie the role of the commodity, and its inherent materiality, to the economic system. Further, this process determines not only what is produced, but also by default what is consumed and thus what is wasted (de Coverly et al., 2008).

The maintenance (and growth) of capitalism is rooted in the maximizing of externalities of labor and nature (J. O’Connor, 1998). One such externality is that of the management of waste. The cost of waste management is typically born by local governments. Corporations, unless motivated by government regulation such as policies of extended producer responsibility, have few reasons⁵³ to consider the disposal management of products in the production process. Thus, the analysis of the commodity,

⁵³ Exceptions to this such as the protection of intellectual property and the guarantee of access to certain types of high value material and feedstocks are discussed in chapter three using the Xerox™ example.

in an understanding of the operation of production under capitalism, opens a space for illustrating the necessity of waste.

4.4.5. Waste as a commodity: capital accumulation and value

Marx (1990, p. 125) begins *Capital* with the commodity: “the wealth of societies in which the capitalist mode of production prevails appears as an ‘immense collection of commodities.’” While the commodity “appears” as a starting point for economic analysis, Marx’s use of the commodity here is to express that from the commodity one can begin to understand social relations by moving backwards to an analysis of the process of production. The commodity, while the starting point for his discussion, is not the starting point of economic relations generally. As Foster (2010, p. 391) notes, “once the commodity form is analyzed and its social reliance depicted, it becomes clear that production, exchange, distribution, and consumption under the regime of capital is the production, exchange, distribution, and consumption of commodities.” Thus, here we can acknowledge the importance of the commodity form, and from this find a basis for the examination of circulation of value, and what is and what is not valued or valuable (waste).

Waste is a tangible result of the relations of production, and it is therefore not surprising that as capitalism expands to encompass and commodify more and more nature, it also encompasses and commodifies the results of its own activities. As noted by de Kadt (1999, p. 131) “waste is normal to capitalism, waste is included in the value of commodities; and waste itself has become a commodity.” The explicit commodification of “garbage” (as a general category rather than individual materials of value such as metal or paper) is a fairly recent occurrence (de Kadt, 1999). According to de Kadt

(1999), waste became a commodity when it was incorporated into the treadmill of production (or as clarified as Foster, Clark, and York (2011), accumulation positioned within “the absolute general law of environmental degradation under capitalism”) through government waste strategies and recycling practices such as the creation of waste hierarchies.

Waste management hierarchies, instituted in many countries in the mid 1990s, resulted in the legislating of municipal recycling activities as a driver for policy.⁵⁴ Waste processing (recycling, reuse, and disposal), with this government support through various landfill reduction policies, is now a multi-billion dollar global industry. The high value of this commodity (garbage) has shifted the focus of waste management strategies (led by industry/production) from implementation of the waste management hierarchy (first step, reduction) to one that supports production with the continued focus on moving waste materials back into the production cycle rather than reduction in the/of the production process. Beyond driving municipal recycling, waste hierarchies also impact industrial production, encouraging reduction, reuse and recycling. As a result we see the development of extended producer responsibility legislation such as that of the 2000/53/EC ELV Directive focusing on the recycling of automobiles.

⁵⁴ The German Closed Substance Cycle and Waste Management Act (CSCWMA) or *Gesetz zur Förderung der Kreislaufwirtschaft und der Sicherung der umweltverträglichen Beseitigung von Abfällen* instituted in 1996 codifies the hierarchy as required by the European Union’s 1996 General Strategy on Wastes. This act more broadly defined the concept of waste and created a hierarchy of order for its management: first waste prevention, then recycling and reuse, and finally, when no other options are available, disposal (European Parliament, 1996). Above all, according to these policies, the avoidance of waste creation should be the focus creating the legal basis for policies of extended producer responsibility.

This government/political support of the movement of material back into the system of production does two important things. First: “it treats all waste as discards and in this it manifests the ultimate irony of capitalism: entrepreneurs really do not care about the nature of the commodity they sell just as long as it produces sufficient revenue” (de Kadt, 1999, p. 150). Thus by involving capital in the role of waste management, by default the focus shifts from one of reduction to one of production; there is only money to be made if there is material to be processed and reprocessed. Second, while waste prevention might be the friendliest ecological option for society and nature, those making money from the commodification of waste through the pushing of it back into the treadmill of production are driven by profit rather than ecological protection (de Kadt, 1999). Thus, “Public policy makers are themselves locked into the treadmill of production. The hierarchy of solid waste management wrongly places the public policy focus on waste processing for profit” (de Kadt, 1999, p. 159). Government in this supports capital through the waste policy and planning process.

Therefore the value of the commodity of waste is not simply determined by the value of the material “open market” as it is related to the production process and the prices of related and necessary goods and services. The government increasingly plays a role in attaching a negotiated value through actions such as the implementation of the waste hierarchy (O’Brien, 1999). Value is therefore determined both by the processes of the reproduction of the commodity and by the state.

Policies such as extended producer responsibility are together an acknowledgement of the embedding of waste management options into a product as well as the broader understanding that the creation of waste is formatted in production.

Government's attempts to regulate production, however, are circumvented by the value of waste as commodified in capitalism. Waste, illustrating the "second contradiction of capitalism," is not something "accidentally" produced; it is something inherent to capitalism. Capitalism requires the continued creation of waste for the continuation of economic growth. This provides an opening for the analysis of the second contradiction of capitalism through the examining of the results of production: the product/commodity.

Wasting, then, can be described:

Not as a loss of value from objects but as a regulated exchange of value between objects: a framework or system for the conversion of value comparable to, and equally important as, a social process of value-transformation, as a counterpoint to the analysis of waste, as an excess or surplus of production and consumption. (O'Brien, 1999, p. 171)

More so, waste can be considered a link in the commodity chain of valorization/devalorization that serves as a placeholder. The functionality of the value is kept in waste, but in a holding state, for future valorization. Therefore, as noted by de Kadt (1999, pp. 131, 133) "garbage is and will remain not only problematic, but also entrenched in the fabric of our system of production, consumption, and accumulation" because "waste is normal to capitalism, waste is included in the value of commodities; and waste itself has become a commodity." Waste is the stage of final consumption that leads back cyclically into productive consumption in reentry into production or the system of exchange of materials. This is illustrated, graphically, in chapter five using the example of the production and reproduction process of automobile manufacturing.

Waste, I argue, therefore is not one of the most "democratic" problems of the growing environmental crisis in that "for every person makes waste and waste generation decisions every day" (Robinson, 1990, p. 1). Rather, waste is decidedly undemocratic –

the “choices” of individuals are meaningless, or at least hold only limited meaning, within the domination of the economic structure. Individual choice only completes reprogrammed action within pre-selected methods for disposal. Therefore as this analysis is made with consumption by Marcuse (1991), Baudrillard (1981b), and Lefebvre (1984), it can also be made with next step in the process: waste/ing.

4.5. MESO-LEVEL WASTE ANALYSIS: A MARXIAN APPROACH

4.5.1 Meso-level analysis

With the importance and applicability of Marxian analysis in understanding waste/ing established, and using this framework as a foundation, a meso-level waste analysis connects the micro to the macro, providing an opening for the understanding of the positioning of waste in the economy. The meso-level does not necessarily reject the study of the micro or macro, but emphasizes, rather, that when studied separately, the micro and macro alone are unable to provide an understanding of the role of waste in the economy and the necessity of its creation in the functioning of capitalism.

Meso-level analysis, to some extent, has been proposed in fields including environmental sociology (Bronfenbrenner, 1979), economics (Dopfer, Foster, & Potts, 2004; Holland, 1993; Mamalakis, 1992, 1996), business management (Avolio & Bass, 1995; Henderson, Dickson, Hess, Coe, & Yeung, 2001; S.J. de Boer, 2005), policy studies (A. W. Rhodes, 1997), and geography (Castree, 1999; Reid, Sutton, & Hunter, 2009; Roberts, 2001). In each iteration of its usage there is awareness that using only micro or macro-level analysis is limited and limiting: micro-level analysis fails to explain the role of the micro with larger systems and macro-level loses sight of the role and importance of the individual (be that person, commodity, or the like). Beyond this broad

generalization of the literature, though, meso-level analysis lacks concise, interdisciplinary and/or multidisciplinary use. For this application, therefore, meso-level analysis is broadly defined as an attempt to combine, or find the space in between, micro and macro analysis.⁵⁵ Rather than an either/or relationship as designated in micro and macro studies, the meso-level is an attempt to connect the micro and the macro.

The use of meso analysis developed here is similar to its use in sociological theory such as that of Read, Sutton, and Hunter (2009). Meso analysis in their framework is a connector of the individual to the macro, a sort of “in-between” that is geographically and spatially necessary to add specificity to the macro and generality to the micro. A graphic depiction of this relationship is that of concentric circles beginning in the center with the individual (micro) and moving outward to the immediate neighborhood (meso), and then to the region, country and world (macro). Critical geography studies also apply this usage. Cox and Mair (1989) emphasize the positioning of the local and local studies within the global, the connection between the two being the meso. Meso analysis in policy studies makes a similar claim with the meso as the networks that connect micro level individual behaviors to actions on the macro-level of political systems (Evans, 2001).

This dissertation research uses the meso as an attempt to understand the *connection* between the micro and macro. Rather than a defined space such as a neighborhood, the meso is both an understanding of the relations of production, specifically productive capital, as well as the tangible relationship between the production, consumption, and disposal of objects, similar to what Read et al. term a

⁵⁵ This project is an initial attempt to define and apply meso-level analysis to waste/ing research.

“mediator” (2009). Where Read et al. (2009) are using spatial zones, this dissertation instead uses the meso as the space of productive capital connecting the macro circulation of production to the object (micro-level), resulting in the making visible of the political.

This attempt to define a meso-level is perhaps similar to what Castree (1999, p. 143) calls “envisioning capitalism” through a “theoretical effort to make critically visible the political economic relations that we collectively constitute, are embedded in and are subject to on an increasingly worldwide scale.” Castree (1999, p. 143) is looking for a new way forward in the context of Marxist geography where the “abstract is thus different from – but *not* opposed to – the concrete empirical because, precisely, it disaggregates the later into component processes and relations.” He focuses on the importance, therefore, of making visible that which capitalism conceals first, illustrating the contradictions and second, providing an understanding of an alternative path without these constraints. This chapter follows along these lines.

4.5.2. The operation of meso-analysis

Connecting the micro (the individual) to the macro (the collective) creates a comprehensive understanding of the necessary role of waste within capitalism. It also illuminates the relationship among waste, capitalism, and the government, providing an interpretation of how government policies support and further capitalist expansion. The meso-level therefore is based in the connection of the commodity to macro-level relations through the second contradiction of capitalism. Further it emphasizes the importance of the value of the commodity to economic (and political) relations of waste.

Meso-level analysis, in this application, is centered within circulations of production. In this, “industry is seen not as the ‘neutral’ transformation of matter, but a

nature-transforming activity structured by social relations” (Peet, 1989, p. 35). As established in the previous section, production is defined and shaped by the materiality of nature. Drawing on the second contradiction of capitalism the meso-level acknowledges that capitalism requires expansion in the use of labor and nature and in the creation of new products, all of which lead to increasing environmental degradation. As stated by Marx (1990, p. 754):

Every advance in chemistry not only multiplies the number of useful materials, and the useful applications of those already known, thus extending capital's sphere of investment along with its growth; it also teaches capital how to throw back the waste from the processes of production and consumption into the cycle of the process of reproduction, and thus, without any previous outlay of capital, it creates fresh materials for it.

This necessary expansion is further supported by science and technology “independent of the given magnitude of the capital already functioning” (Marx, 1990, p. 754).

4.5.3. The meso and productive capital

On the meso-level if we take industrial assembly as a cluster of commodities (commodity chains) which can be commodified in disassembly/recycling/disposal, we can apply Marx’s productive capital loop (Marx, 1993).⁵⁶ Productive capital “signifies the periodically repeated function of the productive capital, i.e. reproduction” meaning: “it signifies that its production process is a reproduction process in respect of valorization; not only does production occur, but also the periodic reproduction of surplus-value” (Marx, 1993, p. 144). Productive capital is one of three forms of capital (also including money capital and commodity capital) that illustrate the cycles of capitalism:

⁵⁶ This is illustrated specifically in the next chapter through the example of automobile production and recycling in the context of the 2000/53/EC ELV Directive.

The capital that assumes these forms in the course of its total circuit, discards them again and fulfills in each of them its appropriate function, is *industrial capitalism* – industrial here in the sense that it encompasses every branch of production that is pressured on a capitalist basis (Marx, 1993, p. 133).

It is in the explication of productive capital circuits that we can begin to assess cycles of use (and discard and reproduction) of commodities. According to Marx, reproduction of production occurs when produced commodities are reinserted back into the production process. This productive consumption requires certain “material circumstances,” raw materials and components to make products originally, as well as more complicated procedures to process products into more complex commodities.

In this the “condition for consumption to occur is that surplus-value is made by means of the commodities they consume” (Marx, 1993, p. 155). Meaning, surplus value is made through the production (reproduction) of products that are already produced. We term these commonly “supply chains.” Products made by one company (company A) are sold to another company (company B). Company B then uses what it purchased from company A as a feedstock to produce a new product that is again sold. This sale may be to a company C which again processes this material into a more complex product. Eventually the product is sold on the market to a consumer. The final product played the role of both finished product and production feedstock in this chain of events perhaps numerous times.

Production becomes more complex as capitalism becomes more complex and is therefore dependent not only on the individual facility producing a product but also on the production of other products by other capitalists used as component parts in more complex production. These linkages can be traced through commodity chains. The equation for this movement as described by Marx (1993) is the circulation of production

capital where P (production, a product is produced) is sold as C' (a new commodity with surplus value) for M (money or ΔM , the increment of money) which is then invested to create a new C' (commodity which contains in it labor power and the means of production) to P (to produce a new commodity).

This tracing of this circulation, production and reproduction of productive capital, can be applied to the recycling of products, illustrating the meso-level through a connection between the micro and macro.⁵⁷ In the micro-level the individual is encouraged to consume more and more material to be (at end-of-life) recycled. The macro is the collective expansion of productive capacity, fueled by the need of and structured to reproduce waste for recycling. The meso-level is therefore illustrated through the productive capital loop, the industry assembly or the cluster of commodities, created and continued by economic necessity both of the macro and of the micro. Recyclable material too can be a feedstock in the productive capital loop. This material can play the same role as products immediately moving from one company to the next until point of sale to the consumer. When recycled products are used as a feedstock, the time period between company A and company B (re)producing a product is simply longer. It plays, though, the same role. Thus products are re-commodified at the time of disposal and re-inserted back into the productive capital loop at the time of recycling.

⁵⁷ As referenced in chapter three an early instance of this re-circulation within capitalist production is found with the creation of the London Sanitation Commission in 1839. Booming industry required large amounts of raw material as feedstock. This commission was tasked with finding ways to reinsert waste into the production stream (the productive capital circuit) due to a lack of available virgin inputs. This reinsertion is found in processes today when it is economically beneficial to use recycled rather than raw materials in production. The London Sanitation Commission example therefore is an early form of this process, legislated through government initiative by what was viewed as necessity.

4.5.4. The meso and the political

The above section thus establishes how waste products, processed as recyclable material, enter into the re-production process. This description is an economic description focused on commodity chains and corporations. By examining this further, though, we can explore the role of the political in supporting this chain of events.

As emphasized by Hajer (1997) and illustrated through the example of the waste “crisis” in the United States in chapter two, policy making creates problems for which solutions can (or must) be found. Further supporting capitalism, and following in the lines of Gramsci, these discussions often take place in the context of hegemonic discourses (story lines) that maintain strength and acceptance even where there are facts to support its dismissal (Fischer, 2003). Currently a hegemonic discourse for the addressing of environmental issues such as waste/ing is that of eco-modernization. Hajer (1997) critiques this narrative as a discourse that attempts to solve problems created by existing institutional structures within these same institutional structures creating the problems. Institutional structures are managed, influenced, and controlled by the economic system; solutions therefore are bounded by systemic constraints. These constraints often produces a relationship that is beneficial to capital. It is in this analysis that the role of the state in supporting capitalist production and expansion is illuminated. This role of the political, conscious or unconscious, occurs in problem and solution formation. The state defines how political “problems” are framed and thus how political “solutions” are selected.

Products re-enter the production cycle through two mechanisms. First, in some instances it is economically beneficial or “cost effective” for firms to use products

already produced and consumed in their production process.⁵⁸ This requires no obvious government intervention through policy establishment.⁵⁹ However, as indicated previously, there is a second way for products to reenter this cycle. If monetary value does not exist in current market relations for the future recycled material, a value can be added to it by an entity such as the state. The state may do this through an act such as the funding of a recycling program or the creation of a law requiring the recycling of certain products (such as automobiles). In the first scenario the state pays for the cost of collecting recyclable material for which a “natural” market does not exist or is inefficient (economically) in collecting large volumes. In the second scenario the state requires the reinsertion of materials into the productive capital circuit to occur by actions of producers or those deemed responsible resulting in the same effect.⁶⁰ The recyclable

⁵⁸ It is important to note, though, that discards can be and often are commodities that produce revenue for waste disposal companies. This value occurs in one of two ways. First the composition of the material (rare metals, embodied energy through processing, and the like) may make the material valuable in further production processes. This is why, for example, a scrap vehicle in Germany is “worth” around \$100 Euros to scrap metal companies. The value is of no interest to automobile companies who do not possess the processing technology to extract this value.

⁵⁹ This is a rudimentary description of this process and it is ridiculous to assume that the economy develops in a vacuum without the state. The point here is to emphasize that the use of materials identified here differs from the use of materials specifically spurred by government intervention. A more adequate description would perhaps be to describe the degree of obviousness of government intervention.

⁶⁰ The *Directive 2006/12/EC of the European Parliament 5/7/12 4:54 PM and of the Council of 5 April 2006 on Waste* prepares for the establishment of such policies by asserting that “The recovery of waste and the use of recovered materials as raw materials should be encouraged in order to conserve natural resources. It may be necessary to adopt specific rules for re-usable waste” (European Commission, 2006). Further this directive asserts that “In order to achieve a high level of environmental protection, Member States should, in addition to taking responsible action to ensure the disposal and recovery of waste, take measures to restrict the production of waste particularly by promoting clean technologies and products which can be recycled and re-used, taking into consideration existing or potential market opportunities for recovered waste” (European Commission, 2006).

material once collected re-enters the system of productive capital in the same way as materials that are cost-effective to recycle enter the system. Thus states pay to have the “valueless” material disposed turning it into a commodity, a product of value, simultaneously.

States take this same action with a more insidious product: garbage. Garbage, when uncollected, causes human and public health hazards. States therefore consider garbage something that time and resources should be spent upon to collect and process. Garbage disposal also occurs within the productive capital cycle (as well as illustrates the insertion of the state into this cycle). Rather than move (or pay for the movement of or otherwise stimulate the movement of) garbage from a disposal point to a production facility such as an aluminum manufacturing plant, the state moves garbage to a different type of production facility, a landfill. This facility is also an example of the internal organization of productive capital. The end products of this process are liquids such as leachate and gasses such as methane. With new technology to “mine” landfills, materials at these facilities might eventually become feed stocks at a corporate production facility in the future. This is not a profit model when the state itself internalizes that collection, movement, and disposal of garbage.

In neoliberalism, however, the removal of garbage becomes a profit model. Surplus value is added to the material (garbage) by the state through the paying for removal services (contracting out this process to private industry). The role of the state is of key importance to this because it is the state that inserts/asserts this value

commodifying garbage.⁶¹ How and why this occurs, therefore, is important to understand economic and political relations and relationships.

4.6. CONCLUSION: WASTE, THE ECONOMY, AND MESO-LEVEL ANALYSIS

While chapter two created a basis in social theory for necessary understanding of waste within the economy (specially capitalism) this chapter further extends this argument through a more detailed analysis of the related to both discard studies literature and Marxian economic theory. Beginning with the micro/macro dichotomy this chapter identifies the failures of each, proposing therefore the need for a meso-level analysis. This analysis, rooted in the circuits of productive capital, retains the materiality of waste while serving as a connector between the micro and macro. While the discussion is here largely theoretical, in the next chapter it will be made visible through the example of the implementation of the 2000/53/EC ELV Directive in Germany.

The case study in the next chapter, therefore, is important to show how this theory is applicable and important. Further it creates a basis for understanding the failings of policies of extended producer responsibility. These failings are due to the underlying economic structure of the capitalist economy. Even with this limitation of capitalism, though, the chapter does attempt to propose possible spaces for change (the likeliness of each is debatable) outside of a fundamental reorganization of the economic structure. This provides an important starting point for further understandings of the necessary role of waste in capitalism.

⁶¹ This commodification requires both labor power and the means of production and therefore is not simply the commodification of the act of waste removal but rather than the actual waste. As identified by Marx, commodity chains include the worker and within this commodification exists both labor power and means of production (1993, p. 155).

Chapter Five

END-OF-LIFE VEHICLES: MESO-LEVEL WASTE ANALYSIS AND THE GERMAN EXPERIENCE

5.0. INTRODUCTION

As established in the previous chapter, waste creation is a necessary component of the production process in capitalism. Policies affecting the production process may therefore allow for an opening for change in how waste is created and managed. In this chapter the theoretical framework developed in chapter four emphasizing the relationship between waste and production is applied to the study of the implementation of the *European Union 2000/53/EC End of Life Vehicle (ELV) Directive* in Germany.⁶² The purpose of this research is therefore to determine to what extent government policies of extended producer responsibility, written to effect the production process, are in fact able to effect production change. To do so, I trace the circuits of productive capital of vehicle recycling through interviews with automotive production company representatives.

This chapter begins with an overview of case study and interview methodology. I emphasize the benefits of the case study for this type of research, specifically the advantages of analyzing the German policy experience. Interviews conducted in Germany in October, November, and December of 2010 provides a foundation for this research. Interviews with auto manufacturing companies reveal how companies approach

⁶² From this point forward the directive will be referred to as the 2000/53/EC ELV Directive.

government voluntary and mandated initiatives to “green” waste and material flows in the production process.

In the second section of this chapter I discuss the interview results. In the interview process I asked representatives of each company four standardized questions to gain understandings of the effects of the 2000/53/EC ELV Directive on industry. I summarize the responses of the companies and provide an overview of the resulting data obtained. From the data collected I pull common themes and experiences.

Finally, I interpret the findings of the interviews in conjunction with supporting information from reviewed documents of relevance. I center this interpretation within the theoretical framework established in chapter four applying an understanding of the necessity of waste, and movements of waste within production specifically and capitalism generally. The process of vehicle recycling as described by the embedded units of analysis (interviews with automakers), illustrated through the circuits of productive capital, adds materiality to this analysis.

5.1. METHODOLOGY

5.1.1. Methodology: case study

Case studies, as described by Yin (2008, p. 18), are “an empirical inquiry about a contemporary phenomenon (e.g. a “case”), set within its real-world context – especially when the boundaries between phenomenon and context are not clearly evident.” This method of empirical inquiry can be applied to a variety of topics. This dissertation research in particular uses the case study to undertake an empirical inquiry into the intended and unintended consequences of the implementation of legislation. In this I use a single-case case study, the implementation of the 2000/53/EC ELV Directive in

Germany, to provide in-depth knowledge and understanding of one particular occurrence of the formulation and implementation of government legislation. The purpose of this case study is not to necessarily provide generalizable knowledge specifically, but rather to examine particular patterns and dynamics that help to create an overall understanding of phenomena. In many instances generalizations are not possible to determine, nor are they necessary. This case study uses data not as an attempt to test a hypothesis but rather to explore the implementation of the 2000/53/EC ELV Directive to flesh out consequences of and conclusions that can be drawn from its implementation.

Embedded in this case study is the use of data from specific automobile manufacturers in the form of interview research (Yin, 2011). This case study therefore utilizes the form of the single-case with multiple, embedded units of analysis. Embedded case study design, as opposed to holistic design, allows for the examination of phenomena while avoiding over-abstraction of the subject matter (Yin, 2009). The embedded units of analysis, in this case Bayerische Motoren Werke AG (BMW), Ford-Werke GmbH (Ford), Adam Opel AG (Opel), and Hyundai Motor Europe (Hyundai), add concrete and tangible understanding in the case study, adding materiality to the general process of production and the circuits of productive capital.⁶³ This is of importance specifically to this research because it allows for the study of the “micro,” specific units of analysis, within the “macro,” or implementation of the legislation, with the end result of a broader understanding of each. I make this connection, attempting to avoid over-abstraction, further through the use of what I term the “meso” level of analysis.

⁶³ Along with the four German manufacturers a phone interview was conducted with AB Volvo in an attempt to gain insight into the Swedish experience.

Logically sound case study research does not rely on a single source of information, such as data gathered only through interviews, but rather utilizes multiple sources of information (Yin, 2011). The case study for this dissertation therefore draws upon published industry reports, reporting documents submitted by member states to the European Union required by the directive, and academic analysis of policy implementation. Together these documents, along with the industry interviews, contain a mix of both qualitative and quantitative data.

According to Flyvbjerg (2006) the case study plays an important, though often disparaged, role in research. In this he emphasizes:

Context-dependent knowledge and experience are at the very heart of expert activity. Such knowledge and expertise also lie at the center of the case study as a research and teaching method or to put it more generally still, as a method of learning. (2006, p. 222)

Flyvbjerg (2006) emphasizes that while often critiqued, case studies can provide important information in both the form of a single method or as a supplement to other methodological approaches. This research employs the case study for both purposes. The case study research described in this dissertation adds an important, and currently neglected, component to the literature. Specifically, this is the focus on the actions and reactions of automotive companies to the 2000/53/EC ELV Directive in Germany. Research up to this point has focused mostly on the reported results of implementation rather than the experience of the automakers. Second, in conjunction with other methodological approaches, specifically empirical research, the information from this case study further provides illumination to the problematic nature of policies of extended producer responsibility.

5.1.2.1. The case study of the 2000/53/EC ELV Directive

In this dissertation, I utilize the case of the implementation of the 2000/53/EC ELV Directive in Germany. The 2000/53/EC ELV Directive is one of several European Union directives targeting the management of waste. This directive is an example of a policy of “extended producer responsibility,” the purpose of which to apply responsibility (in the form of property “rights,” and perhaps more appropriately termed “requirements”) for the financial and environmental implications of the disposal of products at end-of-life. Under the 2000/53/EC ELV Directive, auto manufacturers are responsible for funding the cost of disposal and assuring this disposal meets legislated standards.⁶⁴ The goal of extended producer responsibility legislation is to encourage “design for disposal,” the shifting of production practices to incorporate features that allow for easy disassembly of the vehicle at end-of-life resulting in the increase reuse and recycling of component parts. Extended producer responsibility is an important policy tool to assess generally as the European Union continues to issue this form of legislation (now in use for products such as packaging, waste electrical and electronic equipment, and batteries) for new policies of waste management. Additionally, countries around the world are increasingly implementing policies of extended producer responsibility based on the European experience.

⁶⁴ A comprehensive discussion of the specifics of the 2000/53/EC ELV Directive is located in chapter three. These requirements, briefly, include 1) the development of an accessible system (to the consumer) of vehicle recycling and recovery that provides the service at no cost to the consumer, 2) the certification of destruction of the vehicle at an authorized demanufacturing facility, 3) the recycling of 85% of a vehicle, by weight, on a yearly average by 2006, increasing to 95% in 2015, 4) the removal and eventual ban (beginning in 2003) of the hazardous substances of lead, mercury, cadmium and hexavalent chromium, and 5) the ability to prove, before production, that the vehicle can meet new standards regarding hazardous material and recycling requirements.

Germany is an interesting and appropriate location for the application of this case of study, the implementation of the 2000/53/EC ELV Directive, for several prominent reasons. First, Germany today is the central player in the European Union both politically and economically. The Federal Republic of Germany is one of the six founding members of what is today termed the European Union. Germany's continued influence in the economic and political decisions of the European Union therefore are fundamentally engrained in the operation of the union. While the European Union encourages consensus in voting and negotiation, the recent financial crisis emphasizes the central role of the German government in European policy-making.⁶⁵ This role is not all together surprising; Germany's economy is the fifth largest in the world in terms of the purchasing power parity and is the largest economy by all standards in Europe (Central Intelligence Agency, 2012). Additionally, Germany is considered a leader in European environmental policy, pushing states slow to adopt and enforce environmental legislation towards increased protection, as illustrated, for example, with the passage of the 1998 ELV Ordinance, the precursor to the 2000/53/EC ELV Directive (Sbragia, 2010). Germany is a powerful, influential country both within the European Union and globally.

Second, while the 2000/53/EC ELV Directive is legislated by the European Union, member states must incorporate this directive into national law for operational purposes. States do have discretion in how this directive is translated into state-level law and application of penalties for companies failing to comply with the legislation falls to the state. In Germany environmental protection is well established legally and well supported by citizens (Schreurs, 2002). As discussed in chapter three, the polluter pays

⁶⁵ See for example *The Economic Times* (2012) and Crook (2012).

principle is the concept driving extended producer responsibility, the goal of the ELV directive.⁶⁶ The polluter pays principle is one of five fundamental principles of German environmental policy (Boehmer-Christiansen, 1994, p. 33).⁶⁷ Implementation of the 2000/53/EC ELV Directive by the German government therefore should be expected to be strong, supported by the government and citizens.

Third, Germany has a long experience with the implementation of vehicle recycling legislation. The German Environment Ministry (BMU) introduced the first proposal for vehicle recycling legislation, one of the earliest in Europe, in 1990. After almost a decade of discussion and negotiation among the government, industry, and related organizations, this legislation was incorporated into law in 1998. This deliberative process resulted in a cooperative arrangement with industry, allowing for self-regulation. The resulting 1998 ELV Ordinance eventually served as a model for the writing of the 2000/53/EC ELV Directive, though with several substantial and important differences. First, the 2000/53/EC ELV Directive specifies that costs resulting from the take-back of vehicles are the responsibility of the producer or importer. To facilitate take-back producers must establish a national collection system individually or commission a PRO to do so. While the 1998 ELV Ordinance did not specifically require producer responsibility in that the burden of compliance was placed mostly upon the dismantling

⁶⁶ The *European Parliament and Council Directive (2006/12/EC) of 5 April 2006 on waste* codifies the use of the polluter pays principle in European Union waste disposal policies stating specifically that the “proportion of the costs not covered by the proceeds of treating the waste must be defrayed in accordance with the “polluter pays” principle” (European Commission, 2006).

⁶⁷ The five fundamental principles framing German environmental policy include *Vorsorgeprinzip* (the precautionary principle), *Verursacherprinzip* (the polluter pays principle), *Kooperation* (consensus), *Wirtschaftliche Verwertbarkeit* (proportional costs and benefits), and *Gemeinlast prinzip* (common burden) (Boehmer-Christiansen, 1994, p. 33).

industry due to the strong automotive industry lobby, neither does the 2000/53/EC ELV Directive require producer responsibility specifically. The legislation simply mandates that certain requirements must be met in the deconstruction process. Second, the recycling requirements for vehicles increased with the directive while the amount of material that can be “recovered” (burned in waste-to-energy facilities) decreased. Finally, the directive specified that after July 2003 vehicles containing certain hazardous materials cannot be sold on the market. German automakers, involved in both the implementation of the 1998 ELV Ordinance as well as the 2000/53/EC ELV Directive, therefore have experience with the implementation two different forms of vehicle recycling legislation.

Fourth, Germany is home to a very strong automobile industry. The “German big three” vehicle manufacturers, or Mercedes-Benz/Daimler AG, BMW, and Audi/Volkswagen Group, hold a major global market share of the automobile industry. All of the “German big three” were ranked within the top fifteen automobile companies in volume of total global sales of vehicles in 2010 (the year the interviews were conducted) with Volkswagen ranked as third (OICA, 2011a). The German automobile industry also demonstrates a range of vehicle offerings from high-end model produced by such as BMW to lower end models such as those produced by Opel. Additionally a high percentage of cars purchased in Germany are produced in Germany (Fergusson, 2007).⁶⁸

⁶⁸ Germany as a nation is ranked third in the global manufacture of automobiles manufacturing 9,629,000 vehicles in 2010 and 8,399,000 in 2011 (OICA, 2011b).

As change in production is an important component of the 2000/53/EC ELV Directive, this additionally identifies Germany as an important case of study.⁶⁹

German auto manufactures are associated with several trade organizations, three of which are important in discussions of end-of-life vehicle disposal. The *Verband der Automobilindustrie* (abbreviated VDA, translated into English as “association of the automotive industry”) is a German trade association with membership of sixteen Germany automotive companies. The VDA “promotes the interests of the entire German automotive industry” through organizing automakers into “one association, resulting in decisive advantages for the German automotive industry through direct dialogue and rapid decision-making” (Verband der Automobilindustrie, 2011). The VDA publishes the German Quality Management System that creates industry standards for various production activities.⁷⁰ The association is well organized and coordinates research and lobbying efforts for member companies.

A related industry group that formed as a result of the implementation of the Germany national legislation is the *Arbeitsgemeinschaft Altauto* (abbreviated ARGE in Germany and translated into English as “association ELV”). This organization was created to oversee the implementation of the voluntary agreement as established in the 1998 ELV Ordinance. This organization forged strong ties among auto makers in coordinating responses to national and eventually European Union level auto recycling legislation (Siegward, 2010). This organization helped to prepare automakers for future

⁶⁹ Each of these factors are important in making the case for Germany as a “best” and “critical” case study as is emphasized in the next section.

⁷⁰ This organization is probably best known for the hosting of the world’s largest automotive show biannually in Frankfurt, the *Internationale Automobilausstellung* (IAA).

collaboration in the implementation of recycling regulations, specifically in the implementation of the 2000/53/EC ELV Directive.

German automakers are also members of the European Automobile Manufacturers Association (ACEA) and played an important leadership role in activities of this organization. ACEA is a major participant to European Union level discussions regarding the benefits and drawbacks of environmental regulations related to the design, production, use and disposal of automobiles. The German automobile companies, having experience in negotiations with government officials in the formation of the 1998 ELV Ordinance played an important role in the negotiation in Brussels of the 2000/53/EC ELV Directive.

Finally, Germany is one of the few countries with widely published and reported automobile recycling data. The 2000/53/EC ELV Directive requires member states to submit a report every three years to the European Commission regarding the implementation of this legislation. This report consists of a two-part questionnaire detailing the incorporation of the legislation in national law and associated implementation data, metrics required by the 2000/53/EC ELV Directive. During the 2005-2008 reporting period five member states (of the twenty-five members European Union member states as of 2005) submitted no reporting information. Much of the information that was submitted by the twenty other states was incomplete or unclear (European Commission, 2009). Germany is one of the few states to submit complete data. With few penalties for non-compliance many states have not invested the time or resources into reporting. Germany, with a strong history of environmental policy implementation, continues to serve as a leader in this respect. This reporting data, along

with a multitude of reports authored by the German government, environmental organizations, and research institutions provides important insights into the implementation of the 2000/53/EC ELV Directive.

5.1.2.2. Germany as a critical and best case

Given its prominent role in the European Union and the international automotive industry as well as a history of executing environmentally-focused legislation, including vehicle recycling legislation, implementation of the 2000/53/EC ELV Directive in Germany is considered a “critical case” of study (Yin, 2009, p. 47). The case of 2000/53/EC ELV Directive in Germany provides an opportunity to assess implementation in an environment that is receptive to environmental regulation.

Difficulties in the implementation of this legislation in Germany will most likely be faced, and perhaps magnified, in other European Union member states. This assumption is made based on a combination of factors that should lead to successful implementation: a strong economy, a strong history of environmental policy enforcement, ecologically conscious citizens and, a well-developed automobile sector. Germany serves thus as a “best case” to assess implementation of the 2000/53/EC ELV Directive.

5.1.2. Methodology: interviews

The use of standardized interview methods and appropriate analysis of results can elicit “*in-depth understanding* of a phenomenon” (Manheim, Rich, Willnat, & Brians, 2007, p. 373). In this approach conversations with elites, or people with access to specific types of knowledge, can provide information not available through document review and analysis. This research utilizes elite interviews to enhance the understanding of the effect of the 2000/53/EC ELV Directive in Germany. Elites are defined in this research as

representatives associated with automobile producer recycling operations, or with reporting responsibility of corporate activities as is required by the directive. These representatives give insight into why the corporation act (or failed to act) in a specific manner in the context of implementation.

This research utilizes open-ended, highly scheduled interviews. Open ended interviews are beneficial tools of the research process in that they provide “richer and more extensive material than data from surveys or even the open-ended portion of survey instruments” (Yin, 2011, p. 12). In this, how different participants describe similar events can lead to a more nuanced interpretation of the occurrence. Respondents in this research study were given latitude in the answering questions and often took upwards of twenty minutes to answer each.

Highly scheduled interviews, with predetermined questions asked in a particular order tends to produce standardized data (Manheim et al., 2007). The interviews I conducted are “focused” in that each person was interviewed for a limited period of time (Merton, Lowenthal, & Kendall, 1990). In this research all respondents were asked the same four questions allowing for comparison across datasets. While this method has the benefit of ease in comparability, disadvantages do exist. Prewritten questions, for example, frame the interview process. This may limit new insights provided by the interviewee. Additionally once the research was begun I was unable to change the interview questions to better reflect knowledge gained by each subsequent interview.

5.1.2.3. Benefits of interviews

For this research the interview process is highly useful and relevant for several reasons. First, little systematic research has been completed asking automakers how the

2000/53/EC ELV Directive has affected their production process. What exists is mostly analysis of the results reported to the European Union as required by the legislation for compliance purposes. Kautto (2006, p. 378) for example notes that generally “there is... a lack of empirical research on the relation between individual policy instruments and initiatives and environmentally oriented product design.” This is true for the automobile industry. In order to determine whether or not design change is occurring, automakers must be asked the question. Reporting documents do not require automakers to identify changes in production processes, rather only waste and recycling statistics must be reported.⁷¹

Interview data are especially beneficial to the development of the understanding of company level implications of the directive in that very few researchers have asked automakers the question: “how has the 2000/53/EC ELV Directive affected your production practices?” In this context this research employs a similar study methodology to that of Crotty and Smith (2006). Crotty and Smith use semi-structured questionnaires in an attempt to test the Porter Hypothesis⁷² in the context of 2000/53/EC ELV Directive implementation in the United Kingdom. Specifically they use an interpretative approach following along the lines of Denzin (2001). In selecting this research method Crotty and Smith acknowledge the importance of understanding the narratives provided by

⁷¹ The European Union specifically requires member states to submit statistics relating to the “(a) currently national vehicle market; (b) the end-of-life vehicles on their territory; and (c) the vehicle materials and components included in this assumption, in order to avoid double counting” (Eurostat, 2011, p. 3).

⁷² In this, “Porter asserts that strict, correctly formulated environmental regulation can offer a firm secondary benefits through improved product design and the reduction of waste” (Crotty & Smith, 2006, p. 95). Crotty and Smith do not, however, find support for this hypothesis even though “the ELV directive demands that firms innovate or redesign the end product, subassembly, or component part both to meet the stipulated recyclability targets and for ease of dismantling” (Crotty & Smith, 2006, p. 96)

automakers in describing the change (or lack there of) in design processes as an effect of legislative compliance. Noting that in most research to date this question has not been posed to automakers, Crotty and Smith seeks to do this, providing new data to the body of knowledge. My research mirrors this attempt to understand automakers response in design in the 2000/53/EC ELV Directive in Germany.

Second, interviews allow for the exploration of intended and unintended consequence of waste disposal policies. Again, this information is not reported in official European Union triennial required reports. Most research on the importance of this directive up to this point has focused on the consequences of policy implementation using reported statistics as a method for evaluation. This research seeks to more comprehensively understand the impact of the legislation on the production process. Reiterated, this information is not reported in official European Union documents, and can only be gained through the interview process.

Finally, interviews provide insight into how policies may be improved, modified, or amended to yield varying results in terms of environmental consequences from the prospective of automobile producers. Industry representatives' provide a particular form of insight, though limited by perspective, into the possibility of new and perhaps innovative waste management regulations. These perspectives provide important insight into the role of productive capitalism as perceived by automakers.

The purpose of the conducted interviews is thus to yield richer, deeper understandings of the circuits of waste within production and productive capital. Interview data provides a basis for the performance of meso-level analysis as is constructed in chapter four.

5.1.3. Implementation: interviews with German automobile manufacturing companies

Onsite interviews were conducted with representatives of four automobile companies with production operations in Germany in October, November, and December of 2010.⁷³ The Virginia Tech Institutional Review Board approved the interview procedures and purpose under IRB-10-641. The purpose for the interviews as stated in the institutional review board proposal is to:

Examine policy approaches targeting waste, wasting, and waste disposal to make visible the implications of the European Union's End of Life Vehicle (ELV) Directive (2000/53/EC) in Germany and practices of product stewardship and extended producer responsibility on the state and federal level in the United States.⁷⁴

Further detailed in the IRB proposal:

Practices by producers (specifically Ford Motor Company, Honda Motor Company and Bayerische Motoren Werke Aktiengesellschaft but potentially other producers the opportunity is made available) will be examined through interviews conducted with corporate representatives. The purpose of the interviews will be to gain knowledge as to how government disposal policies have been received and are affecting manufacturing processes. Interviews will be conducted with corporate sustainability and engineering design representatives and last approximately one hour in length. Questions of interviewees will be grouped in the following topic areas:

1) Response to National Policy: How has the corporation responded to national and/or state vehicle disposal policies and agreements?

⁷³ Additionally one telephone interview was secured with Volvo, a Swedish company to provide additional perspective.

⁷⁴ While a request for authorization to conduct research in the United States was also approved this research was not conducted due to time limitations of the dissertation project. Although initially proposed as a comparative study, the use of a single state for analysis, as discussed in the previous section, provides relevant and useful information in the application of meso level waste analysis as constructed in chapter four. In the final chapter of this work I propose a comparative case study of the German and United States experience to further explore the circulation of waste within the process of vehicle production and reproduction under very different forms of legislation.

2) Economic Motivations/Incentives: Are economic motivations an incentive for compliance with national or state policy? Has the company taken action beyond required compliance due to financial motivations or incentives?

3) Corporate Sustainability Concerns: Has the company taken additional steps beyond required compliance to alter product design to improve recyclability?

The interview sample consists of members of the European Automobile Manufacturers Association (ACEA) or companies in the process of gaining membership at the time of the interview.⁷⁵ This membership is an important designation for this research in that member companies must have production facilities located within a European Union member state. Hyundai, while not a European company, does have a production facility located in Rüsselsheim specifically to meet the requirements of ACEA membership (Degen, 2010). While the 2000/53/EC ELV Directive requires that all vehicles sold in Germany are recycled, the distinction of interviewing companies with production facilities is necessary to understand the specifics of the 2000/53/EC ELV Directive.⁷⁶ As described at length in chapter three, this is important because the 2000/53/EC ELV Directive was written specifically to target the production process.

5.1.3.1. Securing interviews

Auto manufacturers were contacted to request interviews initially through email. The email request, written in English, included two attachments.⁷⁷ The first attachment

⁷⁵ Members of the ACEA include BMW Group, DAF Trucks, Daimler, FIAT, Ford of Europe, General Motors Europe, Jaguar Land Rover, MAN Truck & Bus, Porsche, PSA Peugeot Citroën, Renault Group, Scania, Toyota Motor Europe, Volkswagen Group, Volvo Cars and Volvo Group. Hyundai, undergoing the membership process during the fall of 2010, is a full member as of 2012.

⁷⁶ Cars imported into Germany must also be recycled but it is the responsibility of the importing company to oversee this process. In general, though, these vehicles follow the same recycling processes as vehicles purchased within Germany because vehicle recycling in general is cost-effect (or can be facilitated without a cost to import companies, vehicle manufacturers or citizens).

⁷⁷ For the complete text of both documents (English and German) see Appendix B and C.

was a request for interview in English, the second a translated version of this request in German. The request stated my qualifications, the scope of the project, whom I would like to interview, and a broad description of the interview questions. The description of the questions provided to the companies is as follows:

The open-ended interview will include questions such as: How has the corporation responded to national and/or state vehicle disposal policies and agreements? Are economic motivations an incentive for compliance with national or state policy? Has the corporation taken action beyond required compliance due to financial motivations or incentives? Has the corporation taken additional steps beyond required compliance to alter product design to improve recyclability?

While my intention was to interview engineers and upstream members of automobile design teams, the actual selection of the interviewee was at the discretion of the company. I spoke with a range of employees from engineers to public relations managers to policy specialists.

The first interview was secured with Mr. Kai Siegwart of Opel in October of 2010. Mr. Siegwart provided the contact information for his colleagues at the other German automotive companies. It is through his initial introduction that I was able to secure onsite interviews with representatives from Ford, BMW and Hyundai. Requests for interviews with Audi, Mercedes, Daimler, and Volkswagen were unanswered. Additionally a phone interview was conducted with Volvo in an attempt to gain insight into the Swedish experience.

The four German companies interviewed create a representative sample of the German automotive industry. BMW, founded in 1917 to manufacture motorcycles and engines, is a high-end company with a focus on the luxury market with brands including BMW, MINI, and Rolls-Royce. In 2011 BMW sold 1,669,000 automobiles with revenues of 68.8 billion Euros (Bayerische Motoren Werke, 2011). Though total market share for

sales is lower than the other companies, BMW continues to play a leading role in industry efforts for the development of end-of-life recycling and reuse strategies. Opel, a lower end car company focused on sales of affordable models, has an extensive history in Germany as it was founded in 1862 although it did not begin manufacturing automobiles until 1899. Since 1929 Opel is a wholly owned subsidiary of General Motors. Opel does hold a substantial share of the German automotive for its small size (7.7%) market producing 464,430 vehicles in Germany in 2011 at four production locations holding (Opel Corporate Communications, 2012). Hyundai is a wholly Korean owned company with a twenty-year history in Germany providing for a different perspective on automotive production and sales in Germany. Rapidly expanding, sales in 2009 grew more than 131% and in 2010 won the *Autobild* Quality Report (Car Advice, 2012). Hyundai recently joined the European Automobile Manufacturers Association (ACEA), a membership requirement of which is the establishment of production facilities in Europe. Ford (more specifically *Ford-Werke* GmbH) is a hybrid foreign-German corporation produces mass models of popular mid-price range vehicles. Ford's history in Germany dates back to 1912 when it first began manufacturing parts in Hamburg. Volvo, originally a Swedish company dating back to 1927, sold its automobile division in 1998 to Ford Motor Company which then sold its ownership to Geely Automobile in 2010. Volvo primarily manufactures heavy-duty vehicles, with individual passenger vehicles today composing less than 5% of all vehicles produced.⁷⁸ Predominately geared towards Europe, Asia, and North America, thirty-nine percent of Volvo's net sales occur in

⁷⁸ Interestingly, Volvo has a large line of municipal garbage collection trucks, noting that "In the US alone, the garbage removed by refuse trucks from the Volvo Group every week could form a line of full garbage cans that would reach the moon" (AB Volvo, 2011, p. 2).

Europe (AB Volvo, 2011). In 2011 net sales totaled SEK 310.4 billion (or 264.7 US Dollars) (AB Volvo, 2011).

In overall German vehicle registrations in 2011, VW ranked first with 744,128 vehicles (21.21% of the market), Mercedes ranked second with 372,512 vehicles (10.62% of the market), Opel ranked third with 268,357 vehicles (7.67% of the market), and Ford fourth with 258,647 vehicles (7.37% of the market) (Opel Corporate Communications, 2012, p. 41).

All interviews were conducted onsite (at a corporate facility) and in English. Prior to the interview the following questions were emailed to the interviewee in both English and German:

- 1) How has the corporation responded to national and/or state vehicle disposal policies and agreements?
- 2) Are economic motivations an incentive for compliance with national or state policy?
- 3) Has the corporation taken action beyond required compliance due to financial motivations or incentives?
- 4) Has the corporation taken additional steps beyond required compliance to alter product design to improve recyclability?

The interview process centered upon the asking of the four above open-ended interview questions. This standardized list of question was used at every interview. Developing a pre-set list of questions was important for two main reasons. First, to secure the interviews the requested time for the process was indicated as one hour. While some interviews did continue past the one-hour mark, this limitation was set to encourage the securing of interview. Second, pre-set interview questions allow for better comparability of responses across the companies. This interview process therefore was highly scheduled, using predetermined questions asked in the order of appearance as described in the IRB proposal.

Before each interview was conducted interviewees signed an IRB approved consent form for participation in research.⁷⁹ I discussed the purpose of my project and how my interview results would be utilized. I assured each company data requested be kept anonymous would not be released with identifying information. All interviews were conducted without the aid of an electronic recording device per the request of each interviewee.

The anticipated findings proposed in the IRB document state “Interview results will be used to gain knowledge as to how disposal policies are affecting the manufacturing process.” The results of the interviews inform and enhance ideas of how the conceptualization and problematization of waste result in the creation and implementation of waste management policies specifically in the case of vehicle recycling legislation. Interviews of those involved in policy implementation provide important understandings of corporate legislative responses because the passage of a policy does not (and cannot) guarantee standardized implementation (or implementation in general) on the company level. Understanding how policies are interpreted and implemented by these actors therefore informs on a richer level, notions of waste and disposal in the implementation of legislated recycling requirements.

5.2. INTERVIEW RESULTS

As previously stated, I conducted interviews with representatives of Opel, Ford, BMW, Hyundai, and Volvo in the fall of 2010. Interviews ranged in length from one to three hours. Each representative was asked four questions, summaries of the answers to each (in combination) are provided below. All interviewees stated that a condition of the

⁷⁹ See Appendix...

granting of the interview was the maintenance of anonymity in the reporting of interview results. All representatives requested that I not use direct quotes in my published findings. For this reason distinctions are not made among the various automobile companies.

Question one: corporate response to vehicle disposal policies

Each interview began with the following question: *“How has the corporation responded to national and/or state vehicle disposal policies and agreements?”* The purpose of this question is to gage the holistic company response to the passage of vehicle recycling legislation. Being that ELV legislation existed in Germany previous to the passage of European Union legislation it was assumed that compliance with the 1998 ELV Ordinance would effect implementation of the 2000/53/EC ELV Directive. The interviewees did discuss the corporate response to the 2000/53/EC ELV Directive in relation to the implementation of the 1998 ELV Ordinance stressing actions implemented as required by the 2000/53/EC ELV Directive is framed by the reaction to the previously implemented German legislation.

In general the interviewees responded that corporate operations located in Germany were well fairly well prepared to meet European Union requirements due to actions taken to meet the requirements of the previously implemented 1998 ELV Ordinance. In comparison to implementation in other member states by the automakers, fewer procedural changes within corporate structures were required to implement the new legislation in Germany due to the existence of networks and infrastructures among automakers and recyclers previously developed.

A goal of the 2000/53/EC ELV Directive as well as the 1998 ELV Ordinance is to encourage companies to design reuse and recyclability into the components of vehicles through the concept of “design for disposal.”⁸⁰ Most of the companies interviewed reported that prompted by the prospect of German legislation in the early 1990s they did attempt to create processes for take-back, deconstruction,⁸¹ and reuse/recycling operations under the spirit of the discussions and agreements taking place over the course of the 1990s. Companies such as BMW instituted programs for the purchase of various models of old automobiles for the purpose of learning more about the deconstruction process (Hang, 2010). Because companies had not previously designed automobiles for disposal, or had reason to be aware of automobile disposal practices they were unaware as to what was required for or even the process of auto deconstruction. They therefore needed to gather this information not only to determine how to deconstruct vehicles already on the road at end-of-life but also in determining how to design a more easily deconstructible automobile for the future. As companies developed an understanding of the technical process of deconstruction they identified (what I consider to be perceived) four barriers to their involvement (as producers) in the deconstruction process. These barriers are identified below.

First, the automakers quickly realized that deconstruction of automobiles at end-of-life requires a variety of tools, skills, and labor not currently available or existing in readily usable organizational structures. A shift to the incorporation of recycling and reuse of components by the vehicle manufactures would require a significant addition to

⁸⁰ A comprehensive discussion of this design method is detailed in chapter three.

⁸¹ Deconstruction is vehicle disassembly with the purpose of reusing the removed parts.

corporate activities. These activities, it was determined, would diverting greatly from the mission of the company (automobile production).

Second, automakers “discovered” that a large amount of change to current vehicle design was needed to ready various components for increased and more efficient reuse and recycling efforts. Automobiles are complex products using a wide range of metals and plastic composites. The average passenger cars contain around 15,000 distinct parts (Lucas, 2001). Parts are combined into components often with the use of adhesives that are difficult to un-attach at end-of-life. This separation, however, may be required for the recycling process as was identified in the third chapter. Designing for reuse and recycling therefore necessitates the redesigning of many key components for ease in the separation of materials at the end-of-life. This may include the use of different adhesives or fastening technologies. Additionally a variety of plastic components are used in the manufacture of vehicles. Unless separated by composite type during deconstruction (both composition and shape) these pieces cannot be recycled; plastics recycling can only occur when plastics are separated by composition and shape.

In describing barriers for re-design or designing for disposal, several of the corporations illustrated the difficulty in designing parts for recycling and reuse through anecdotes of attempts deemed unsuccessful. These examples were used to emphasize why certain technologies tested did not work, discouraging further attempts at design change. One such example given was the description of the development of a door panel using only two types of material, a metal backing that served as the exterior of the door and a plastic piece serving as the auto interior. The use of only two parts, the metal outside and the plastic inside, allowed for easy separation at the time of disposal. The

metal outside, if in good condition, could be reused on another automobile. The plastic interior, most likely worn due to frequent use, could then be recycled as it was composed of one uniform plastic composite. In testing the new product, though, it was found that the doors, while designed for easy reuse and recycling, were hard and uncomfortable for passengers. Eventually the redesign of the doors was abandoned due to low consumer satisfaction in product testing.

Third, corporations described the difficulty of designing a vehicle for recycling with a long life expectancy. The average vehicle is on the road for approximately 17 years. The corporations stressed the inability to predict new technological innovations and therefore frustration with the push for designing of recycling into a vehicle that may be inapplicable or out of date at the time the vehicle actually recycled. They emphasized the hope for the development of innovative plastic recycling technology that would allow for the recycling of multiple forms of composites simultaneously. The development of this technology would allow car design to remain the same (or eliminate the need for any future design change) while increasing recycling rates of vehicles to those required by the European Union in the mid-2010s. Companies emphasized that they considered it unproductive to “freeze” technological developments due to recycling at end-of-life when the product design can and should continually improve.

Finally, as corporations began exploring methods for legislative compliance they found an existing dismantling industry (specifically the existence of what are commonly termed “junk yards”) with economic incentive to recycle vehicles without government mandated recycling requirements. Many of the automakers expressed frustration that the perceived motivation for the 1998 ELV Ordinance was actually to shut down small,

environmentally hazardous and previously not stringently regulated dismantling operations. Whether this was only perceived or an official motivation by the German Environmental Ministry (BMU), the result has been a great change in the dismantling industry since the 1990s. Pre-1998 more than 5,000 dismantlers existed in Germany. This number has been greatly reduced with many dismantlers not even applying for government certification after the implementation of the 1998 ELV Ordinance, instead simply closing down (Bleischwitz & Hennicke, 2004).

As a result of these factors, the current automotive industry strategy is to *support* the existing recycling and dismantling industry rather than attempt to dismantle, reuse, and recycle vehicles in-house. This support comes in two predominant forms. First, as a response to the 1998 ELV Ordinance Recycling automakers began working with dismantlers to establish company specific lists of “certified” deconstruction (or destruction) facilities. These lists were to advertise to customers both at the time of purchase and, when contacted, at vehicle end-of-life. While the automakers did not establish a PRO specifically, this relationship with dismantlers serves that function. The degree to which this relationship was formalized depends on the auto manufacturing.

Second, automakers also provide support to dismantlers through the development of highly technical tools and equipment to support vehicle deconstruction. This has mainly occurred in two forms. First, companies have worked to develop tools to help in the manual deconstruction process of automobiles such as specialized screwdrivers and wrenches (E. Rhodes et al., 2006). Second, BMW specifically is spearheading efforts to develop new plastic composite recycling technology. This is occurring in conjunction

with an industry effort to develop “smart” shredder technology to aid in the plastics recycling process.

Today automotive companies, with two notable exceptions, have mostly abandoned design-for-recycling and in-house deconstruction activities. The first exception is related to the implementation of the European Union’s the *Directive on the Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment* 2002/95/EC (RoHS).⁸² This directive, entering into force July 1, 2006, restricts the use of six materials considered hazardous in the production of electronic and electrical equipment.⁸³ The directive has encouraged what the interviewees termed “design for “pre-treatment” – i.e. the redesign of certain components that contain restricted materials such as the powertrains and batteries for easy removal from the automobile at end-of-life. A major difference between this directive and the 2000/53/EC ELV Directive is that the 2002/95/EC RoHS Directive *requires* the removal of specified materials while the 2000/53/EC ELV Directive, encouraging reuse, does not specify that it must occur. The 2006/66/EC *Directive on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC* has a similar result of design for disposal. This legislation designates that batteries must be recycled therefore automakers indicated that they do take battery remove before deconstruction in

⁸² From this point forward this directive will be referred to as the 2002/95/EC RoHS Directive.

⁸³ While addressing similar concerns of the European Community directive 2002/96/EC on waste electrical and electronic equipment (2002/96/EC WEEE Directive), the 2002/96/EC WEEE Directive focuses on the use of waste electronic and electrical products used as components within in the production of products such as automobiles. The 2002/96/EC WEEE Directive specifically restricts the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ether.

consideration in the design of the vehicle. This difference in implementation of the 2000/53/EC ELV Directive and the 2002/95/EC RoHS Directive and 2006/66/EC Battery Directive is further explored in chapter six.

Question Two: Economic Motivations for Policy Compliance

The second question posed to company representatives was: “*Are economic motivations an incentive for compliance with national or state policy?*” The question was written to determine if corporations found the incorporation of reuse and recycling strategies into vehicles an economically beneficial practice outside of the legislative requirements. Overall the corporations responded that there are not economic motivations as incentives for compliance with the German application of the 2000/53/EC ELV Directive.

The interviewees responded that the automakers undertook dismantling studies to understand the economic implications of vehicle recycling upon the proposal of German legislation in the early 1990s by the German Environmental Ministry. The purpose of the studies were to understand the vehicle recycling process generally as well as determine how automakers could incorporate this activity into their practices. Automakers concluded that four factors are necessary for vehicle recycling: equipment, place, people, and labor time. Each of these is factors was input into the economic calculation of the cost benefit analysis of recycling processes for the automakers.

Further, though, in analyzing the recycling process for vehicles, automakers realized that it was possible for vehicles to be recycled for a profit (rather than a loss). Dismantling companies existed for this purpose based on the profit of materials sold from recycling before government discussions for the mandating of recycling. Under the

legislated version of Germany vehicle recycling law, 1998 ELV Ordinance, automakers were only responsible for financing the cost of vehicle recycling if that responsibility must be assumed. In other words, as long as vehicles were recycled automakers maintained no financial liability in the recycling process. The 2000/53/EC ELV Directive also designates this responsibility for the economic cost of recycling of vehicles only if they are not recycled through other (market based) processes.⁸⁴

Upon the realization that it was possible for recycling to be profitable (or at least occur at no cost to the automakers), their recycling strategy became one of “risk avoidance.” Risk, by several of the interviewees, was defined as the potential of financial responsibility for vehicle disposal. The avoiding of risk is the current automaker recycling strategy, rather than the redesign of the automobile for recycling and reuse. The companies therefore find no legislative requirement or economic incentive to recycle vehicles or redesign vehicles for the recycling process.

Overall, in response to this question the interviewees stated that there are no external economic motivations or incentives for automakers in compliance with the 2000/53/EC ELV Directive. Surprisingly, “improving the corporate public image” was not mentioned by any of the interviewees as an economic benefit of legislative implementation. Companies are very aware of the “public” call for recycling of all types of materials including vehicles. Each company highlights sustainability activities on the corporate homepage and is quick to offer copies of yearly environmental reports.

⁸⁴ Member states have the discretion of determining how the 2000/53/EC ELV Directive is implemented on the state level, including the economic and physical responsibility of automakers. In Sweden, for example, consumers pay an upfront recycling fee when purchasing a vehicle. This fee is required even though the recycling of a vehicle, to automakers, is cost free due to the dismantling market (Andersson, 2011).

Interestingly, recycling is viewed as a non-competitive aspect of the vehicle production industry by all interviewees. Rather than massive promotion of individual recycling efforts, the companies, working in a tightknit group, encourage the promotion of industry efforts. Corporate representatives facilitating the implementation of the 2000/53/EC ELV Directive all expressed an open and positive relationship with their colleagues at competitor corporations.⁸⁵ This is especially useful for automobile companies in that all vehicles, at this point, are recycled by the same dismantlers rather than are taken back by the manufacturer of origin. While some companies also certify individual dismantlers and advertise these to consumers at the time of vehicle purchase, dismantlers are not brand specific in the recycling process. Thus there is no difference across the companies for the process of downstream recycling. One result of this is the development of cooperative, industry-wide technologies. For example, the interviewed companies are all members of IDIS, an information sharing system developed by the automotive industry to share information with vehicle dismantlers to facilitate ease in disposal. Several of the companies are also working together to develop shredder technology. The purpose of this collaboration is to share jointly in the financial cost of developing new recycling technology necessary to comply with upcoming, more stringent recycling requirements in the 2000/53/EC ELV Directive. Without a change in the number and type of different plastic composites in vehicles, new shredding technology such as the IDAS system, is necessary to meet recycling requirements.

⁸⁵ Having said this I was only able to interview representatives of four companies even with letters of introduction and the direct contact information for those responsible for directive compliance at the four other major automobile companies. I cannot determine whether these interview requests were ignored due to poor relations between the representatives of some companies or for other undisclosed reasons such as a lack of interest, corporate policy, etc.

Question Three: Financial Incentives Beyond Legislative Requirement

The third question asked to each corporation was “*Has the corporation taken action beyond required compliance due to financial motivations or incentives?*” The purpose of this question was to determine if other financial incentives existed for the incorporation of strategies of extended producer responsibility within the vehicle production industry beyond the penalty of non-compliance.

The general answer to this question was “no.” Interviewees responded that they did not have any financial incentive to take additional measures of extended producer responsibility beyond those required by law. In answering this question corporations repeated the perceived difficulties of implementation highlighted in the previous answer. Generally, rather than finding other incentives for compliance, several of the companies reported that the legislation has increased corporate costs. This is due mostly to administrative procedures required for data gathering and reporting. Corporations, for example, have found it necessary to hire new employees to complete legislated reporting requirements. New certification programs for dismantlers also required the investment of corporate resources.

Question Four: Product Recyclability Improvement

The final question asked to each corporation was “*Has the corporation taken additional steps beyond required compliance to alter product design to improve recyclability?*” The purpose of this question was to assess if companies are moving beyond recycling requirements into innovative vehicle design change for recycling as is proposed as a result when implementing policies of extended producer responsibility. The

question therefore attempts to determine if the policy has served as a motivator for innovation, encouraging the re-thinking of practices.

All companies responded that they have generally moved away from redesign efforts for demanufacturing and recycling on a holistic basis. Recycling is infrequently considered in the design stage (with the exception of some hazardous materials regulated by the 2002/95/EC RoHS Directive) and is categorized as a downstream concern.

Interestingly, corporations, with the exception of Hyundai, are moving towards the development of “global vehicles” that meet the design and recycling requirements of multiple countries. This is a move away from country or region-specific designs, the norm up until this point. The motivation behind this is that cars often designed for one market are eventually exported to markets in other countries or regions. Designing multi-state standards into all vehicles reduces re-design needs as the market for these vehicles are expanded. All interviewees using this practice emphasized that this “made sense” in the globalized market place. The design of global vehicles, therefore, could have great implications for future changes in production.

5.3. THE 2000/53/EC ELV DIRECTIVE AND MESO-LEVEL WASTE ANALYSIS

5.3.1 The importance of meso-level analysis

Utilizing documents and the conducted interviews it is possible create an understanding of the role of waste in the economy and this relationship with the political through the application of meso-level waste analysis to the 2000/53/EC ELV Directive. As emphasized in the previous chapter, meso-level analysis provides a frame for the examination of production through an exploration production chains that allow

connections between the micro and the macro. This analysis can make visible economic and power relations concealed within the commodity.

In this section I use meso-level analysis to analyze of the commodity chain of automobile production and reproduction within the application of the case study (the implementation of the 2000/53/EC ELV Directive in Germany). I begin by acknowledging the materiality of the automobile as emphasized in the fourth chapter to provide a foundation for meso-level analysis. Next I introduce the “problem” of waste as identified by the 2000/53/EC ELV Directive. Finally I examine patterns and dynamic in the production and reproduction process. In this Marx’s (1993) description of productive capital illustrates both the initial production of the automobile as well as reproduction through reuse and recycling as is encouraged as the intent of the legislation.

5.3.2. The materiality of the auto

In chapter four I discuss the importance of what I, and others, term the “materiality of waste.” Specifically, section 4.1.1. focuses on what is considered a lack of understanding or acknowledgement of this materiality in most waste scholarship. The result is a detachment of the micro and the macro, the individual or object and the greater system in which it operates (economically, politically, and socially. Meso-level waste analysis is an attempt to avoid this detachment or abstraction grounded in the materiality of the production and reproduction process.

To maintain the focus on materiality this case study investigates specifically the material results of the implementation of one policy, the 2000/53/EC ELV Directive, in Germany. A material exploration of the production process affected by this policy

requires an understanding of material flows specifically in the context of reproduction.⁸⁶

The embedded units of analysis, the interviewed automobile companies, provide understanding of and tangibility to the actual flow of material within the overall analysis of broad movements of production and reproduction. The meso analysis, as identified through interviews with automakers as well as the review of documents is used to illustrate and understand the phenomena, the circulations of power and economy surrounding the implementation of the 2000/53/EC ELV Directive, while attempting to avoid over abstraction.

As this research focuses on the materiality of the auto and its components within the process of production and reproduction it is important to note that the automobile is a tangible good with material consequences. The deconstruction of this object impacts both the financial and the ecological environment of the state. Improper removal of hazardous fluids, for example, can destroy biological systems such as waterways. Use of virgin rather than recycled materials may increase energy demands in production. These impacts, and others, are concealed within the relations of production unless they are made visible through something such as meso-level analysis. Understanding material flows in through process can be used to understand larger political and economic systems by adding tangibility to these relations.

5.3.3. Defining of the (political) “problem”: ELVs as a waste to be managed

⁸⁶ To be explicit, materiality in this discussion consists of two facets. On one level this discussion is theoretical, linking to section 4.1.1. in the discussion of the “materiality of waste.” This is the focus on the material implications of waste to avoid over abstraction of on the macro level that can lose site of the tangible implications of objects of waste. On another level materiality in this research is used specifically to refer to the specific components and processes in automobile recycling.

Previous to the passage of the 2000/53/EC ELV Directive the automobile was not defined as a “waste” product by auto manufacturers. (Hang, 2010; Siegward, 2010). Automakers actually did not give any particular category to vehicles at end-of-life (Siegward, 2010). The disposal of vehicles was external to automobile companies, and thus something of concern to the consumer and the state.

An industry did exist, though, outside of the original equipment manufacturer (the automobile company) to collect, deconstruct, recycle and reuse components of vehicles at end-of-life. This industry, automobile demanufacturing, processed and then reinserted components of vehicles at end-of-life back into the circuit of productive capital.⁸⁷ These companies did and continue to do so because they found value in automobiles in the form of scrap metal as well as through markets for used parts. Thus, before government intervention through regulation, an industry existed to reprocess and repurpose vehicle components due to embedded value of the components comprising the automobile. Before the implementation of the 2000/53/EC ELV Directive the automobile demanufacturing industry was fairly unregulated making it difficult to make industry estimates as to annual profit margins and recycling volumes. This information was simply not reported or collected.

A change in the notion of the value of the auto at end-of-life occurred, according to the automobile companies, when the German government and later the European Union defined the auto as waste to be managed by the associated industries through

⁸⁷ Productive capital, as introduced in chapter four “signifies the periodically repeated function of the productive capital, i.e. reproduction” meaning: “it signifies that its production process is a reproduction process in respect of valorization; not only does production occur, but also the periodic reproduction of surplus-value” (Marx, 1993, p. 144).

extended producer responsibility legislation.⁸⁸ This redefinition of the “value” of a vehicle (now negative for automobile manufactures) led to a new conceptualization of the object by the manufacturers. The object, or the automobile at end of life, became a “risk” (economically) rather than a neutral (or perhaps more specifically an unconsidered) product (Siegward, 2010). The end-of-life vehicle became a risk because vehicle manufacturing companies, previously able to externalize any associated cost of vehicle process, disposal, or other end-of-life activity, became “responsible” for the movement of this object back into the productive capital circuit. “Risk” therefore exists in the potential of automobile companies to have financial responsibility (or financial implications) related to this reinsertion.

As discussed in chapter four, in the policy process, how a problem is defined frames, limits, and bounds what will be considered as possible policy solutions (Fischer, 2003). In the context of vehicle recycling the “problem,” framed as one of needing to increase the recyclability of vehicles, was unnecessary according to representatives of the auto industry. As automakers stated in interviews when exploring the process of automobile recycling they discovered a market and industry already existed for the reuse and recycling of end-of-life vehicles. Automakers argued that passage of the 1998 ELV Ordinance and later the 2000/53/EC ELV Directive was actually motivated by poor implementation and format of existing regulations of vehicle demanufacturing facilities and a history of environmental harm within these industries (Siegward, 2010). This is

⁸⁸ I use the term “associated industries” here because while extended producer responsibility targets the original manufactures of a product (in this case the automobile makers) in practice in the German experience the automobile demanufacturing industry has played an important component in the implementation of vehicle recycling legislation.

perhaps evidenced by the implementation of the 1998 ELV Ordinance resulting in the closing of more than two-thirds of all salvage facilities many of whom did not apply for certification due to inability to meet the new environmentally stringent facility standards (Bleischwitz & Hennicke, 2004). Instead of regulating the industry “causing” the pollution (specific material recycling facilities), the government required the reduction of the end-of-life environmental impact of the vehicle as a whole (Bleischwitz & Hennicke, 2004). This was completed through general recycling quotas but also the requirement of the removal of hazardous materials from vehicle production.

As this chapter will continue to illustrate, it is under environmental auspices that government policies of extended producer responsibility seek to “protect” the environment by limiting the externalization of waste by corporations. This government action, though, has the effect of applying a value to waste, valorizing and inherently commodifying the material in money terms. This creates a new form of value for waste, supporting its management within the system that created it: capitalism.

5.3.4. Meso-level waste analysis

Grounded in the materiality of objects of waste, meso-level waste analysis seeks to combine the micro (the individual) to the macro (the collective) to create a comprehensive understanding of the necessary role of waste within capitalism. Centered in production we can therefore trace the role of the automobile as a produced commodity and through recycling, and examine how it is re-inserted into the productive capital circuit. Meso-level analysis, for example, can be the study of a cluster of commodities (commodity chains) that are commodified in the vehicle deconstruction process. The cluster of commodities described in this example is thus the commodity chain of the

production of the automobile. Automobiles are complex products composing of several thousand parts. Automobile companies do not manufacture each of these, from virgin materials. Rather, productive capital is evident as parts manufacturers sell finished product up the supply chain until they eventually are eventual used in the finished product sold to the consumer.

As identified in chapter four, recycled or reused parts are reinserted back into the production process because of both the embedded value of these manufactured parts and today because of the requirements of the 2000/53/EC ELV Directive. The “material circumstances” of production are therefore are raw materials as well as materials returned to the production process.

5.3.5. Meso-level waste analysis: productive capital circuits

The case of the 2000/53/EC ELV Directive illustrates how the political can support the circuits of productive capital. To understand this implementation in Germany, though, we must begin with the role and influence of the 1998 ELV Ordinance. The 1998 ELV Ordinance affected not only the producers of automobiles, but rather the entire circuit of productive capital that was already in existence. How each actor in this chain is affected, though, is a result of power and economics.

Kotzab and Westhaus (2005, p. 559) illustrate what is called the “reverse supply chain” of automobile recycling in the figure below. This what is illustrated is a recovery network or the optimal network designed to manage the movement of ELV vehicles.

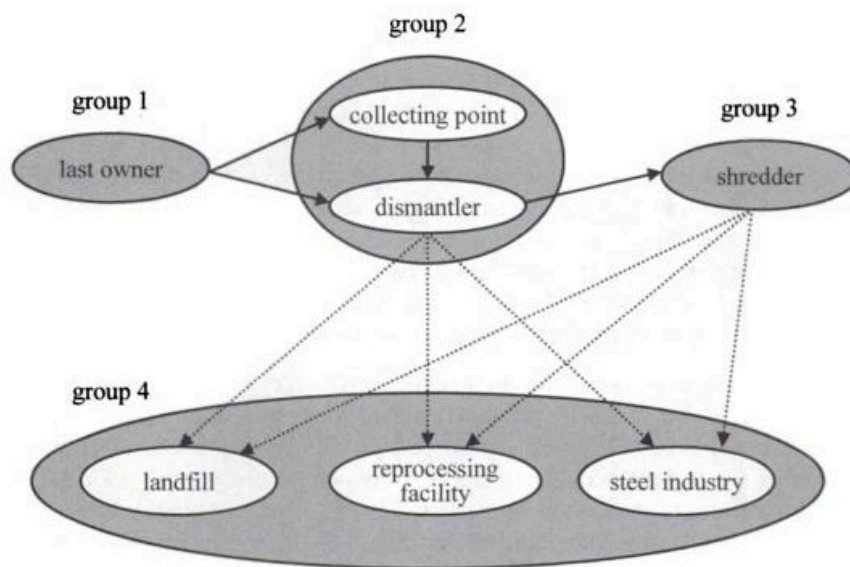


Figure 1: Reverse Supply Chain of End-of-life Vehicles

Fig. 5.1. Reverse Supply Chain of End-of-Life Vehicles [used with permission]
Source: Kotzab and Westhaus, 2005

Group one in this figure is the last owner of the vehicle. Under the 2000/53/EC ELV Directive this person is responsible for delivering a vehicle, at end-of-life, to a collection point or dismantler.⁸⁹ The second group consists of both collection points established by the auto industry and certified dismantlers. Collection points move products to dismantlers. Certified dismantlers, the more frequently used of the two, are dismantlers regulated and approved by the government. Automakers also enter into agreement with dismantlers using an internal certification process. Dismantlers “certified” by individual automakers are advertised to consumers at the time of end-of-life when companies are contacted for more information regarding disposal. From this second step vehicles may

⁸⁹ Per German regulation if a collection point or certified dismantler is not available within 50 kilometers of the vehicle owner, the auto industry must finance the cost of transporting that vehicle to a collection point or certified dismantler.

take one of two paths, either to shredders or to group four facilities (landfills, reprocessing facilities, or the steel industry).

Taking into account, though, the productive capital circuit, the process of vehicle life can be illustrated as:

Productive Capital: Automobile

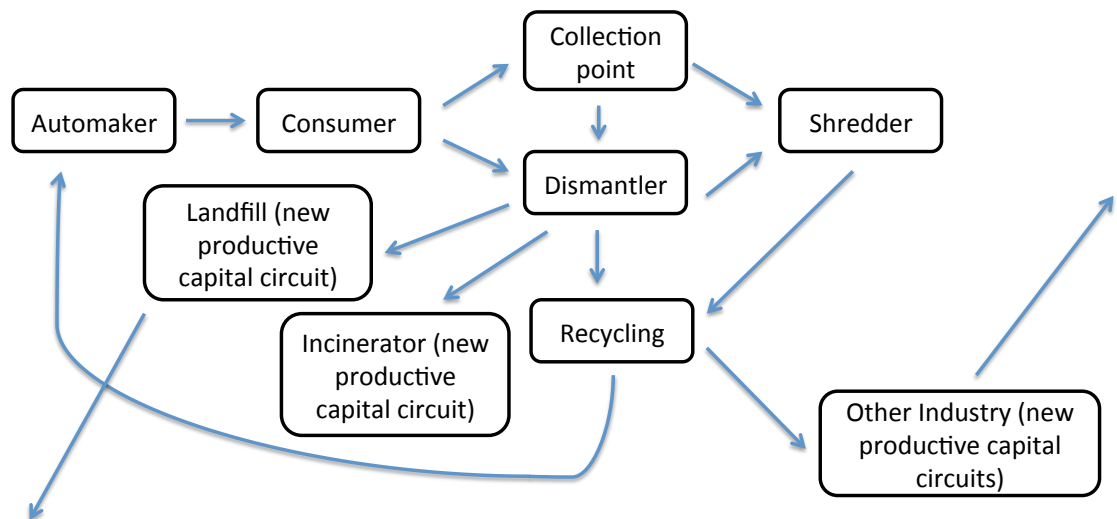


Fig. 5.2. Productive Capital: Automobile
Source: Author

It is through the illustration of commodities in the productive capital circuit that the movement of material and value can be traced. While this circuit existed before the implementation of the 2000/53/EC ELV Directive, it is estimated that only 75% of an automobile was being reinserted back in the productive capital loop of vehicle production (either automotive or other traditional forms of production, the remainder shifted to the

landfill or incinerator, alternative loops of productive capital) (Lucas, 2001). This is due to the high value of metal as well as ability for metal to be fairly easily recycled. The remaining 25% of the vehicle, though, contains plastics, fluids, and composites. These materials are less profitable to recycle and may have a high cost in disposal unless incinerated. The passage of the 2000/53/EC ELV Directive, however, inserts the political into the equation of the circuits of productive capital requiring that 85% of the vehicle (10% of what previously did not have value to dismantlers) be re-inserted into the automotive productive capital cycle. This insertion of the political is important to explore for several reasons.

First, recycling policies such as the 2000/53/EC ELV Directive support the hegemonic discourse of ecological modernization and technological rationality (Kroepelien, 2000). The dominant method for addressing environmental issues uses increased technology in production and disposal rather than reducing levels of production. Although “reduce” is posited as the top of the waste hierarchy and the precautionary principle is considered a foundation of German law and European Union policy in the 2008/53/EC Waste Directive, extended producer responsibility is the focus on technological solutions for addressing environmental issues. As stated by Kroepelien (2000, p. 168): “EPR presupposes the ability of modern society to adjust production patterns within the concept of technological knowledge and thereby reduce waste-related environmental problems.” By focusing on the technology of end-of-life the initial production (or pre-production) of a vehicle is not questioned. The vehicle at end-of-life is a problem of consumption and disposal, not of production. This is a further example of how “recycling has also functioned in cultural terms to divert attention away from

stronger reforms,” intentionally or unintentionally benefiting industry at the expense of a macro view of the role of the automobile within greater issues of sustainability (Rogers, 2005, p. 158).

Second, as is identified in the study of environmental economics, corporations create environmental “problems” through the externalization of harms. While policies of extended producer responsibility are posited as a way of forcing the internalization of an externality (waste), this is not a result of the implementation of the 2000/53/EC ELV Directive. Automobile companies are not internalizing end-of-life vehicle management or incorporating end-of-life vehicles at any large scale into new productive capital circuits through design changes (though this material may enter these circuits through the recycling process and to a limited extent reuse coordinated by remanufacturers). Rather, corporations are supporting the externalization of disposal arrangements by providing resources to third party companies that process this material. This connects to the concept of risk in vehicle recycling legislation. As the 2000/53/EC ELV Directive is implemented in Germany, automakers are only responsible for the recycling of vehicles at end-of-life if this task is not completed in some “other” way. “Other” in this respect referring to the vehicle demanufacturing industry. Thus, the “waste” automobile becomes a “risk” only if system of demanufacturing is unable to process this material. While attempting to affect western notions of property rights such as possessive individualism through reasserting responsibility on the producer, the externalization of waste remains intact in that responsibility is not extended to the producer of the product but rather delegated elsewhere. This type of recycling and waste reduction policy (specifically the implementation of the 2000/53/EC ELV Directive in Germany) is therefore not innovative

or system altering. It simply maintains, through tweaking, the system of productive capital already in place before the passage of the legislation.

Finally, this example illustrates how states support consumption within capitalism providing incentive for continued production and feedstock to productive processes. The 2000/53/EC ELV Directive does not require a reduction in production but rather regulates how produced materials must be reused, recycled, and reinserted into the productive capital circuit. Thus, the re-production of products, in required recycling in the form of legislation such as the 2000/53/EC ELV Directive, fuels the engines of capitalism, further expanding needs in production. This policy of extended producer responsibility strengthens the necessary role of production capitalism by providing continued feedstock for production. This legislation is not in opposition to production (i.e. waste reduction, the first pillar of the waste hierarchy) but rather it is subsumed by it. Extended producer responsibility can be considered what is termed a form of “reengineering” a flawed system that requires creative destruction for continued economic growth (Farmer, 2005; Schumpeter, 2008).

5.3.6. Meso-level analysis: differences in capital (power)

It is important to note that not all types of capital have the same influence in interacting with the state. Differences do exist in political power. This is clearly evident when examining the role of the automotive and dismantling industries in the ELV negotiation processes. As emphasized in chapter three,

Automobile producers had been able to fight off far-reaching measures such as commitments to take back end-of-life vehicles free of charge or to significantly increase the recyclability of new cars, operators of return stations, dismantling facilities, and shredders had to incur considerable expenses in order to comply with the far-reaching environmental standards laid down in the ELV ordinance (Bruijn, 2005, p. 109)

The burden for legislative implementation was not shared equally by all parties but rather shouldered by the least powerful sector politically. One implication of this as identified by de Clercq (2002) is the focus on end-of-pipe solutions such as shredding rather than changes in production. What became regulated was the dismantling industry, not vehicle production.

5.3.7. Meso-level waste analysis: possibilities for change?

As established in chapter four, waste is inherent to the process of production. In this chapter a policy intended to affect this production process, 2000/53/EC ELV Directive as implemented in Germany, is assessed. The result of this exploration is the finding that 2000/53/EC ELV Directive, co-opted by capitalism, and supported by the state, is unable to substantially effect the production process. This leads to the question of what might be able to influence reorganization or production, or if this reorganization is even necessary. Chapter six addresses these questions, searching for openings for change.

Chapter Six

DISPOSAL APPROACHES: OPENING A SPACE FOR ALTERNATIVES?

6.0. INTRODUCTION

Extended producer responsibility is a policy tool utilized in an effort to alter and/or shape the process of production. By assigning responsibility for the management of the product at end-of-life to the producer, the assumption is that the producer will re-design the product with disposal in mind. This should lead to products designed for easy recycling and reuse as well reduce the amount of hazardous materials used in the production of the product. The 2000/53/EC ELV Directive utilizes this concept of extended producer responsibility in an attempt to “green” product end-of-life, and, by default, the entire supply chain, of vehicle manufacturing. This research is therefore an attempt to understand to what extent this outcome is occurring and for what reasons.

As identified in the previous chapter the 2000/53/EC ELV Directive illuminates an example of how capital and the state can work together to further the needs of capital, subverting (consciously or unconsciously) the intended goals of policies proposed to promote a certain form of environmental protection. This case study raises important questions as to how legislation can or should be formed for environmental protection purposes and to what extent policies can actually lead to changes in the production process. It also raises questions as to if and where spaces or openings exist in production that have the possibility of leading to a change in the design of products such as the

automobile (the intent of the 2000/53/EC ELV Directive). This chapter proposes several spaces where this type of design change may potentially find a supportive environment.

In a recent article Stitzhal (2011, p. 27) takes up the discussion of what might motivate producers to consider recyclability, reusability, and environmental impact in product design. Geared towards the American experience Stitzhal centers his discussion within the concept of product stewardship.⁹⁰ As the extended producer responsibility and product stewardship literature overlap in the discussion of the role of the producer responsibility, this discussion is relevant to states policies geared towards the greening production processes. Further, product stewardship provides an opening for the consideration of actions of parties beyond the producer in end-of-life management. This is especially relevant to the case of the implementation of the 2000/53/EC ELV Directive in Germany in that the brunt of regulatory implementation is not born by the producer but rather by the dismantling industry. Finally, this discussion is especially relevant in considerations what might motivate production changes in this discussion in that product stewardship is generally a voluntary rather than a legally mandated practice.

Stitzhal (2011) identifies several potential drivers for design change in products geared towards end-of-life management: consumer demand, market demand (as a result of consumer demand), competitive demand (the want of green product market share), internal company demand, social demand, and regulation/legislation. More specifically I

⁹⁰ Product stewardship places responsibility for the environmental impact of the entire life cycle of the product (including disposal) upon all parties that come in contact with the product (producers, merchants/sellers, consumers, and the government as coordinator of waste management collection). The purpose is to give all parties some role of responsibility in the environmental impact of the product. While environmentally friendly disposal is an important component of this effort, as a result the producers may not be required to take the product back at end-of-life for recycling or disposal. This type of strategy can be considered a diffusion of responsibility.

group his proposals into the categories of government incentives, internal corporate incentives, and market forces (consumer demand, market demand, and competitive demand). Using these categories as a starting point for analysis this chapter explores motivations and openings for change in government policy, economic incentives for corporations, and changes in operation of property rights in the context of the market to understand how change may occur in vehicle production.

The chapter considers the possibility of finding some opening for change in production process through the application of more stringently structured legislation. Legislative initiatives have proven to alter the design and production of automobiles, but at this point only for a very limited range of materials. Drawing upon the successful example of the *Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2002/95/EC Directive* as well the *Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC entered into force on 26 September 2006*, well-formatted or re-formatted policy prescription are explored as spaces for change.

Next, I explore corporate motivations for automobile production redesign. Reverse supply chain management is an industry-based concept describing the attempt to coordinate the return of products at end-of-life to producers. This management tool is used for several reasons, many of which are similar to the motivations identified in the environmental policy literature as industry benefits of instituting programs of extended producer responsibility. This section describes how motivations resulting from the incorporation of reverse supply chain management practices by automakers might

encourage producers to re-design products for recycling without the need for extended producer responsibility legislation.

Extended producer responsibility is a concept based in recognizing the Western applications of property rights in encouraging externalizations such as the management of waste at end-of-life. Changes in structures of ownership are proposed as methods for encouraging design change in the production process. This section explores how new methods of car ownership may lead to openings for such change. Focusing specifically on the model proposed by the company Better Way this section identifies how leasing systems, similar to those utilized by mobile phone companies, might provide alternatives for ownership and thus disposal systems.

Finally, the chapter questions the environmental benefit of the original 2000/53/EC ELV Directive. Is redesign of the automobile for recycling environmentally beneficial? Should this be the focus of waste policies? This discussion takes up these questions in a critical manner relating to the circulation of the automobile in the circuits of productive capital.

6.1. POLICY PRESCRIPTIONS AS AN OPENING FOR CHANGE?

6.1.1. Successful examples of the 2002/95/EC RoHS Directive and the 2006/66/EC

Battery Directive

In February of 2003 the European Union adopted the *Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2002/95/EC Directive*.⁹¹ This directive restricts the use of several types of hazardous

⁹¹ From this point forward this directive is referred to as the 2002/95/EC RoHS Directive

substances in the manufacture of electrical and electronic equipment.⁹² Although exemptions do exist for devices where the removal of these substances is infeasible, these exemptions are rare and narrowly defined. The result of this legislation, for the most part, is the banning of the use of certain materials (Hristev, 2006). While this directive was passed in conjunction with European Union electronics recycling legislation and does not specifically target the recycling of the automobile as a whole, it does apply to the management of several components used in automobile production.

In the interviews conducted for this research interviewees stated that the 2002/95/EC RoHS Directive, unlike the 2000/53/EC ELV Directive, did in fact encourage automotive design change and design for disposal. The question this raises is thus, why did this legislation encourage design for disposal while the 2000/53/EC ELV Directive did not? Both are premised on the same logic of reducing the environmental impact of the disposal of products by regulating the production process. Additionally, both were implemented in the same time period, the early 2000s. With implementation, however, only the 2002/95/EC RoHS Directive, according to the interviewees, has had a substantial impact on the design and production process of automobiles.

Overall, the 2002/95/EC RoHS Directive is considered a policy success in that as a result of its implementation six substances have been phased out of the design and production process of electronics in the European Union; companies overall have complied with this legislation (Ezroj, 2010). This legislation has had further consequences in production in that it is credited with changing production and product design globally. Many manufactures, including and beyond automakers, acknowledge

⁹² Specifically lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ether.

that this legislation has shifted design for not only products sold in the European Union, but due to the globalized nature of the supply chain, has also resulted in the phasing out of many of these banned components in production world-wide (van Rossem, Tojo, & Lindqvist, 2006). This adds to further implications for the impact of “successful” vehicle recycling legislation. All interviewees with the exception of Hyundai stated that they are moving away from regional design platforms and towards to global vehicle platforms. This is mainly prompted by cost reduction in future re-design as vehicles are sold in various regional markets. Specifically, automakers increasingly export models from one market to another if they are found to be successful in the original market.

As previously mentioned, while the 2002/95/EC RoHS Directive has impacted the automobile industry, the electronics industry bears the brunt of most of the impact of directive compliance. The 2002/95/EC RoHS Directive⁹³ was passed in conjunction with the *Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment*⁹⁴ specifically to address hazardous materials in electrical equipment.⁹⁴ The 2002/96/EC WEEE Directive is an attempt to legislate extended producer responsibility in the disposal of electrical and electronic equipment (similar to the 2000/53/EC ELV Directive).

Interestingly, there is debate as to whether the 2002/96/EC WEEE Directive has today influenced redesign of products (Ezroj, 2010). Citing one of the few studies

⁹³ From this point forward referred to as the 2002/96/EC WEEE Directive.

⁹⁴ According to Castell, Clift, and France (2004, p. 5), citing a letter from the American Electronics Association (AEA, 2000), the two directives were proposed separately due partly to the US lobbying regarding trade interests: ““concerns [were] raised by the distinguished members of [the U.S.] Congress about striking the proper balance between environmental protection and open trade,” (AEA, 2000) with a veiled threat to invoke the World Trade Organization.”

published assessing the impact of the 2002/96/EC WEEE Directive on product design (the specific example of lighting industry), Ezroj (2010, p. 62–3) notes that “This study, and more theoretical discussions on this point, appear to indicate that WEEE is not fully satisfying its promise of motivating environmentally friendly design.” While a comprehensive body of assessment literature does not exist, other authors do state findings of design change for recycling linked to implementation of the 2002/96/EC WEEE Directive and the 2002/95/EC RoHS Directive in Sweden as well as legislation in Japan (van Rossem et al., 2006).

Regardless of the debate in the literature (or perhaps more accurately, lack of debate in the literature since few attempts to quantify change exist) this discussion does beg the question as to if extended producer responsibility policies, encouraging environmental design, can result in production changes, especially in comparison to policies such as the 2002/95/EC RoHS Directive. The success of the 2002/95/EC RoHS Directive may be due to the banning of production activities rather than the encouraging of specific types of practice.⁹⁵ Policies requiring bans, therefore, rather than specifying the percentage of the vehicle that must be recycled, recycling motivate changes in production.

A second directive that may shed light on the discussion of changes in production practices is the *Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC entered into force on 26*

⁹⁵ It is important to note that this dissertation only addresses 2000/53/EC ELV Directive implementation in Germany. There is a good deal of literature that critiques the 2000/53/EC ELV Directive policy generally for the failure to create strict standards for recycling across the European Union member states. See for example Castell et al (2004), Clift and France (2006), and Mayers (2007).

*September 2006.*⁹⁶ Interviewees also indicated that this directive, like the 2002/95/EC RoHS Directive, has generated design change in the production process. The 2006/66/EC Battery Directive was adopted with the goal of better management of hazardous materials contained in batteries such as mercury, cadmium, and lead at the time of disposal or end-of-life. The 2006/66/EC Battery Directive has several components: designating the maximum quantity allowable for several hazardous materials, requiring recycling collection programs with designated battery collection rates, and creating rules for the labeling and documentation of batteries. This directive does not prohibit the use of materials including lead, as does the 2002/95/EC RoHS Directive for certain electronic equipment, but rather designates that these products should be easy to remove from electronic equipment at end-of-life for appropriate disposal.

A section of the 2006/66/EC Battery Directive specifically targets the vehicle industry. The directive prohibits the disposal of automotive batteries in landfills or by incineration.⁹⁷ Interviewees responded that in reaction to the requirement of the removal of batteries from vehicles at end-of-life, automakers do consider battery placement in an effort to make removal as easy as possible in the design process. This is an example, then, of a successful design for disposal policy of extended producer responsibility.

While the 2000/53/EC ELV Directive, according to the interviewed automakers, has not resulted in the altering of vehicle design for recycling purposes, it is possible that more stringent or strictly written legislation modeled upon the 2002/95/EC RoHS

⁹⁶ From this point forward this directive is referred to as the 2006/66/EC Battery Directive.

⁹⁷ In the case of most batteries legislated collection requirements and recycling requirements are for a specific percentage of total waste batteries rather than an overall disposal ban.

Directive and the 2006/66/EC Battery Directive perhaps would require design change in the production process for the recyclability of automobiles rather than simply relying on end-of-pipe solutions, as is now the case with the 2000/53/EC Directive. This explicit legislation requiring disassembly and reuse could take many forms. For example legislation could require a certain percentage of the vehicle, by weight, to be reused rather than recycled. The directive could also require vehicle disassembly rather than grinding and sorting forms of recycling. The directive could specify which type of materials must be used in production to promote recycling such as higher metal content (metal is more easily recyclable). Finally, the directive could go so far as to legislate the design of vehicles with interchangeable parts requiring reuse of major components of the body in future product. Legislating design change in this manner, strictly requiring the reuse and recycling of components that eliminate end-of-pipe solutions for a majority of the vehicle in the destruction process, would reduce possibilities for a default towards specifically recycling only “easy” to recycle materials.

As noted by Cerin and Karlson (2002, p. 21), production is the best place to improve life cycle impacts of products such as recyclability, but producers are “neither obligated nor stimulated enough to do so from a sustainable development perspective.” Calcott and Walls (2000, p. 236) further support the idea that incentives may need to come from outside of business, specifically the government:

A more general conclusion of the paper is that so-called upstream instruments do appear to be necessary to spur DfE [design for environment] activities on the part of producers; a disposal fee does not provide sufficient incentives for DfE without a fully functioning recycling market. We argue that there are no feasible policy instruments to generate the first- best outcome in this case.

Cerin and Karlson specifically utilize the term “design for the environment” (often abbreviated DfE) or the decision of firms to reduce the environmental impacts of the entire lifecycle of a product from production to disposal.⁹⁸ Design for environment strategies focus one of two places in the product lifecycle: “upstream” or “downstream.” Upstream incentives target the producer of a product through methods such as extended producer responsibility or other legislated requirements. Downstream incentives target consumers through the use of disposal fees in an attempt to encourage upstream design change through price signals at the consumer level. The downstream method is critiqued by many for the lack of ability to send appropriate price signals for a variety of reasons due to the constraints of the market economy to producers (Cerin & Karlson, 2002). Calcott and Walls therefore develop a quantitative framework to assess the optimal incentive to encourage producers to “design for the environment” (DfE). It is from this economic analysis they determine that upstream methods best encourage environmentally motivated changes in production.

While these incentives might be necessary, it is questionable as to if the vehicle manufacturing industry would find interest in supporting the passage of any amendments to the existing legislation requiring production re-design. The industry in general has not encouraged the passage of legislation with specific directives but rather, as was the experience with the 1998 ELV Directive, prefers to work with the government to set voluntary industry measures sharing the “burden” of implementation with the demanufacturing industry. The interview responses also emphasize the “problematic” nature of the 2000/53/EC ELV Directive as perceived by automakers, making support for

⁹⁸ DfE also identifies a specific program facilitated by the United States Environmental Protection Agency that certifies products through a green labeling system.

further legislative options more difficult given the concerns with the currently legislated process. As discussed in chapter five, both the German and the European automotive industries coordinate strong lobbies and it can be assumed that changes in the directive will be difficult to make without industry support.

The industry perspective, gained from the interviews, indicates that strengthening of the legislation, especially in the requirements for specific practices of producers, would not be welcomed. The assumption is that the legislation will following along similar lines of that already in place, strengthening recycling requirements. The question may be asked, though if there is a possible scenario in which the industry would support more stringent legislation. If so, the passage of the legislation may be more likely without strong industry opposition. To answer this question it is important in understanding the impacts of environmental legislation on the industry.

Rugman and Verbeke (1998) propose four reactions/compliance responses by industry to the implementation of environmental legislation: “active reduction of compliance costs” (no benefits, only cost), “passive compliance” (costly with limited benefits, comply only where necessary), “partial offsets – cost but with real benefits,” and the Porter Hypothesis’s “complete offset – benefits generated exceed costs.” The perspective of the interviewees gained through the interview process is that the 2000/53/EC Directive can be considered one of “passive compliance.” Is it possible, though, to implement stricter regulations that will be supported by industry? The Porter Hypothesis asserts that: “strict, correctly formulated environmental regulation can offer a firm secondary benefits through improved product design and the reduction of waste” (Crotty & Smith, 2006, p. 95). Crotty and Smith, however, reject this claim for three

reasons. First, cost savings from pollution remediation are not “free” because of the lost opportunity cost of not pursuing other opportunities (Palmer, Oates, & Portney, 1995). Second, this form of legislation “locks in” processes for production rather than promoting forms of organic innovation in design. Risks are less likely to be taken due to a focus on compliance (Sharfman, Meo, & Ellington, 2000). Finally, the cost of research to find pollution reduction strategies such as those associated with waste at end-of-life may not be offset through savings (Ayres, 1993; Jaffe, Peterson, Portney, & Stavins, 1995). With these acknowledged general limitations as well as the history of vehicle recycling in Germany, it is difficult to propose a form of extended producer responsibility that would be viewed as positive by the industry.

6.2. CORPORATE INTERESTS AS AN OPENING FOR CHANGE?

6.2.1. Corporate motivations for designing for disposal

Although when interviewed automakers did not indicate the existence of corporate practices or policies motivating design change, it is possible to entertain the idea that automakers may find motivations outside of policy prescriptions for incorporating recyclability and reusability into the design of vehicles. Business management literature provides an insight into possible motivations for corporations to incorporate practices that in effect “green” the entire supply chain in an attempt to save money. These arguments are entirely unfamiliar to the discussion of product design. Many of these reasons identified within the business management literature are the same reasons offered within environmental policy, industrial ecology, and waste management literature in supporting the implementation of policies of extended producer responsibility.

6.2.2. Reverse Supply Chain Management

Reverse supply chain management explores how producers may retrieve products from consumers at end-of-life (Hristev, 2006). Terms such as “reverse logistics,” “reverse chain,” “product lifecycle management,” and “reverse supply chain” all are used to describe this practice generally. This dissertation research specifically focuses on Guide and van Wassenhove’s (2002, p. 25) commonly utilized definition of reverse supply chains as “the series of activities required to retrieve a used product from a customer and either dispose of it or reuse it.”

Benefits for the management of products using reverse supply chains are similar to those highlighted in the extended producer responsibility literature: the ability to reuse parts saving money in production costs, general cost reductions through increased incentive to design to re-utilize products, and improvement of corporate environmental image (Álvarez-Gil, Berrone, Husillos, & Lado, 2007; Hans, Hribernik, & Thoben, 2010). This literature, paralleling extended producer responsibility analysis, focuses on the economic benefits of producer involvement at end-of-life of the product rather than the implementation of extended producer responsibility policies as required by legislation or the environmental advantages of corporate managed end-of-life practices. The industry, in reverse supply chain management, is in control of the parameters in this decision making process.

While the interviewees did not identify motivations for the consideration of end-of-life in the design stage, this body of literature emphasizes that this is a concern for some producers for a variety of reasons. From this literature it is possible to identify several motivating factors for extended producer responsibility practices other than

government requirements through legislation. First, the use of reverse supply chain management can be beneficial to corporations in the collection of feedstocks (products at end-of-life) for (re)use in the productive capital chain. These products when collected undamaged can be reused into the production of new products, saving money by reducing the number of new materials that may be created or input. Runkel (2003) notes that under “perfect” conditions, policies of extended producer responsibility lead to increased product durability (and therefore increased opportunity for longer lifespan). The more durable the product, the longer it can be reused in its original form and the more it offsets additional new material needs in production. Product collection at end-of-life also provides feedstocks of recyclable materials that can be melted into new products.

This practice of retrieving a components of a product for reuse by the producer at end-of-life does not simply exist in theory. Car companies are doing this on a limited basis. For example Ford’s program for the recycling of plastic bumpers into taillights is often noted as an example of this practice (Dhanda & Hill, 2005). BMW’s design of easy to remove and reuse body panels composed of plastic from the Z1 model is another frequently cited example (Gupta, 1995). Examples such as these, though, are the exception rather than the rule. The question then becomes what company or industry specific factors might encourage or enhance the profitability of these activities. Xerox’sTM use of a leasing program to protect intellectual property may serve as a motivator, although this seems less likely in the automotive industry due to technology not serving as a driving feature for vehicle purchases in the same way as it does in the electronics industry. The elimination of secondhand products in the market, also a motivation for Xerox’sTM leasing program, also seems unlike giving the long life cycles

of vehicles. An increase in leasing programs for vehicles could serve the purpose of providing a feedstock for reuse and recycling if pursued by automakers.

Two factors that may encourage companies to design for disposal are the increasing importance of guaranteed access to rare earth metals and the public image benefits of promoting environmental activities. Rare earth metals, while not actually rare, are difficult to find in concentrated forms for mining and extraction purposes. These metals, therefore, are considered scarce in the context of ease of exploitation. The International Union of Pure and Applied Chemistry defines seventeen of these elements and several are used in the manufacturing and production of vehicles. Lanthanum, for example, a rare earth metal, is used in the electric battery of the Prius. As a result Toyota has taken the unusual step of investing in the purchase of a mine to guarantee the supply of this material (Service, 2010). As vehicles move towards alternative forms of energy such as electric power it can be assumed that rare earth metals will become increasingly important in product manufacturing. Reverse supply chain management may become an economically viable method of reclaiming and assuring access to these materials.

Second, consumers are increasingly reporting interest in the purchase of green products and as a result companies continually tout “green” efforts in corporate reporting and public advertising. At the moment the interviewed automakers indicated that they view vehicle recycling as a non-competitive facet of business management and therefore do not promote individual company recycling efforts. A change in this industry culture, though, could lead to the potential for increased competition in car “greening” activities. If this occurs automakers may actively compete for the status of “greenest” automobile

on the road promoting the use of reused and recycled products secured through vehicle recycling practices.

6.3. NEW STRUCTURES OF OWNERSHIP AS AN OPENING FOR CHANGE?

Modern property rights are based on exchange relationships. As described in chapter two, in the western tradition property rights are well established and firmly supported by the state. Macpherson's concept of "possessive individualism" describes this exchange relationship as one where individuals enter into exchange relations as possessor or owner of one's capacities. Entering into the market place, or as described by Macpherson a possessive market society, is a choice. With this entry certain rules are observed. One such rule is that once property changes hands, ownership of that property changes hands. Meaning, when you purchase a product from a company you possess the right to use that product without obligation to the producer. These relationships of exchange are without obligation to the larger society, further alleviating corporate responsibility for the management of the product at any period of life once it has changed hands.

Extended producer responsibility is a rethinking of this notion of ownership. By forcing the assignment of property rights to the producer of the product at end-of-life, the producer must take responsibility for a facet of product life that is often externalized: waste disposal. In modern capitalism corporations are encouraged to externalize costs when possible and this is certainly the case with the management of products when designated as waste. A non-legislated method encouraging product redesign for recycling and reuse could perhaps then take the form of a new model of ownership and designation of property rights. As stated by Cerin and Karlson (2002, p. 2):

Ownership rearrangements of life cycle emissions and the responsibilities that come with it, central to our theoretical analyze, is one potential method to allocate responsibility for environmental harm. In practice however, barriers to such a policy principle is likely to be considerable due to the influence by powerful stakeholders in society, opposing radical changes

While powerful stakeholders may not support this option, what happens, though, when producers decide to implement new ownership arrangement? The next section explores this question.

Better Place is a new model of car ownership that may serve as a framework for imagining how ownership (at least within capitalism) might be reimaged. Better Place is a company that provides a service, that of an electrical vehicle operating infrastructure, rather than ownership of a product. Better Place is building an electric vehicle network in Israel, with plans for expansion to Denmark, to test market this concept. Israel and Denmark serve as good testing grounds due to their small sizes as well as tax structures that differentiate between traditional fuel cars and electric vehicles providing tax breaks to the later.

While still early in the testing phase, Better Place's current business model is to implement an innovative sales structure termed "accelerating the transition to sustainable transportation" (2012). Rather than purchasing a car in a traditional ownership structure, consumers will purchase driving distances via contract in a method similar to the purchasing of minutes for a mobile phone or on a phone card. This purchase will subsidize the cost of the equipment needed to utilize this service as well as the service. This configuration is also similar to the payment structure for mobile phone equipment and service. Better Place estimates that once the electric vehicle the infrastructure is available in purchase areas, the operating cost of vehicles can be "up to 70% lower than

that of a gas-powered one in some markets, even when factoring in the amortized cost of the battery” (Better Place, 2012).

While people will continue to buy vehicles, Better Place will provide a leasing service for the use of batteries, the electric power to fuel the batteries, and all associated maintenance costs. This new fuel and component ownership structure potentially has great implications for the future of automobiles. First, if it is successful and cars do increasing move from fossil fuels to electricity for power there will be an increase in the number of cars slated, more quickly than currently estimated/assumed, for recycling. This may by default make any changes to gasoline and diesel-powered vehicles to increase reuse and recyclability in the production of new vehicles a moot point or at least add a level of difficulty. Second, moving towards a leasing design, and away from complete ownership of segments of a vehicle, may be a first step in adoption a mobile phone type system for the leasing of the service of a vehicle rather than the purchase of a vehicle for ownership. This model for ownership has great implications for future product design. One could perhaps then imagine the exchange of various other components of the vehicle, extending for example the life of the frame, body, and/or chassis.

6.4. IS CHANGE “GOOD?:” RECYCLING AS AN ENVIRONMENTAL “SOLUTION”

6.4.1. Effectiveness of vehicle recycling policies

Extended producer responsibility is promoted, both in the academic literature and by governments such as the European Union, as an environmentally beneficial method for product disposal. While the European Union continues to institute policies of this form in an attempt to decrease the environmental impact of products, it is important to

question the environmental benefit of this type of materials management. As indicated by Lucas (2001, p. 25) “There are no clear indications that the approaches being taken actually lead to a more environmentally beneficial product.”

The existence of an automotive recycling industry in Germany before the implementation of the 2000/53/EC ELV Directive along with the flourishing of this type of industry in countries such as the United States that have not instituted national level vehicle recycling legislation leads to question the necessity of extended producer responsibility legislation to promote reuse and recycling. In a comparison of German and United States vehicle disposal activities Nakajima and Vanderburg (2005, p. 185) found that in the United States, where national level vehicle recycling legislation does not exist “above and beyond the removal of these parts for safety, regulatory, and shredder compatibility reasons, many more parts than in Germany are removed. Some of the dismantled parts are sold for reuse or remanufacture.” This study indicates that without recycling quotas it is possible, and perhaps more likely, for corporations to reuse parts. Further this report finds that in the United States 9-10% more of the individual vehicle is dismantled, a much higher percentage than that in Europe, and a smaller percent of the vehicle, after recycling, is sent to the landfill in comparison to practices in the European Union (Nakajima & Vanderburg, 2005). This study raises important questions over the ability for extended producer responsibility legislation to implement its intended effect.

The 2000/53/EC ELV Directive required 85% of all vehicles, by weight, be recycled in European Union member states by January 2006. According to the interviewees (statistics were not kept before the passing of the law) this percentage was basically met (Siegward, 2010). A major difference in the recycling industry before and

after legislation implementation should be noted. The mandate of vehicle recycling legislation did increase environmental standards for the recycling process (European Commission, 2012). While the actual percentage of the vehicle recycled by weight may not have changed, the procedure for recycling has become highly regulated, especially in regards to the disposal of hazardous materials such as fluids contained in waste vehicles.

6.4.2. Design for recycling or design for reduced impact?

Hofstetter et al (2002) warns of the indirect effects of environmental policies such as extended producer responsibility in contributing to “ripple effects.” Further recognized by Stitzhal (2011, p. 27), “attempts to lessen environmental impacts at one stage of a product’s life cycle may actually increase the impacts at other life-cycle stages, sometimes with an unintended net loss to the environment.” He notes that the focus on the recycling of a product may be misleading as an environmental “solution” in that its creation may still be environmentally harmful or use massive amounts of energy, each a factor in general environmental degradation.

One frequent critique of the 2000/53/EC ELV Directive by the interviewees was the questioning of the “greenness” of the legislation. With reuse of material determined as an unlikely and unfeasible option, it is important to note that both recycling and recovery (the burning of plastics through waste-to-energy facilities, the favored option of disposal by automakers) have environmental impacts with respect to CO₂ release. Pagell et al (2007) emphasize that the literature on end-of-life policies has not comprehensively looked at the environmental implications of recycling such as the life cycle implications of CO₂ production in various forms of end-of-life disposal.

Tests conducted by BMW (Hang, 2010) illustrate through life cycle assessment that recycling is not necessarily the most environmentally beneficial disposal method. Already developed infrastructure further supports the “reasonable-ness” of this option. For example, energy can at times be at high demand in central Europe. Central Europe is home to four post-shredding devices for automotive shredder residue (ASR) that can create a substitute for coke to be used in blast furnaces. Recycling companies are not able to select this method for disposal because recovery is not included as a method for disposal as designated by the 2000/53/EC Directive. Other recovery options such as the mixing of plastic “fluff” with sewage waste before burning, considered a reuse option by the vehicle industry, is also not allowed by the 2000/53/EC ELV Directive (Hang, 2010). These examples result in the question of “what is the ‘greenest’ method of disposal?” With consideration criteria that still may need to be developed. These questions remain to be answered.

6.5. CONCLUSION: OPENINGS OR SPACES OF CHANGE?

This chapter begins the process of identifying potential spaces for change in the production processes of vehicles. While these proposals are in no way comprehensive, they offer places for future research, rooted within the circuits of productive capital. In further exploring any of these methods of change, one must consider how each are situated within the economic structure of capitalism because it is the mode of production that drives the manufacturing of automobiles.

Chapter five identified how a policy, written to effect the production process, is subverted by capitalism, and this subversion is supported by the state. The structure of capitalism creates many barriers to any manufactured change to the system of production.

Capitalism requires expansion and will utilize tools such as recycling and reuse when it makes sense for growth in production. These tools, often promoted for their “ecological” benefit may or may not result in a net positive impact for the environment. The dynamic nature of capitalism also allows for shifts and changes to further incorporate all that exists within its structure. Due to these limitations, it is questionable if production can be manipulated in any true ecological way within the confines of the current economic system.

Chapter Seven

CONCLUSION AND RECOMMENDATIONS FOR FURTHER THEORY AND PRACTICE

7.0. INTRODUCTION

This dissertation attempts to make a critical contribution to the fields of environmental political theory and environmental policy as well as the growing field of discard studies. To do so, this work combined critical social theory with study of the environmental policy process. Through waste this research examined the role and relationship of environmental degradation in modern economic and political relations. My hope is to begin an interdisciplinary conversation with the result of furthering this important dialogue about the role of waste in the economy to understand the reasons for environmental destruction.

This dissertation, using the case study method, analyzed the implementation of the 2000/53/EC ELV Directive, a policy of extended producer responsibility, in Germany. Extended producer responsibility has been theorized and promoted (in the literature and by the German government as well as the European Union) as a policy tool that encourages the redesign of products (in the production process) to consider the disposal of materials at end-of-life. The purpose is specifically to increase the reusability and recyclability of products. The policy targets the production of products because how and when an object will be waste/d is determined in this stage of the product lifecycle.

Theoretically, the implications of successful implementation of policies of extended producer responsibility are quite beneficial for the environment, society, and the

economy (both generally and with regard to producers). This dissertation, however, has questioned whether its full, complete, or successful implementation is really possible, at least in the case of implementation of the 2000/53/EC ELV Directive in Germany. The findings in this work illustrated how the implementation of the 2000/53/EC ELV Directive in Germany has not resulted in changes in the production process but rather has led to a focus on end-of-pipe recycling practices performed by the dismantling (not the automobile manufacturing) industry.

As emphasized in chapter five, Germany has been both a critical, and best, case of study. Germany had several factors that many believe this supported successful policy implementation in comparison to other European Union member states such as a history of the enforcement of strong environmental legislation, a public concerned with environmental efforts, government coordinated vehicle recycling requirements dating back to the 1990s, and a well-developed and prosperous automotive industry. The inability of this policy to spark a change in the production process, then, raises questions as to the extent and ability of policies of extended producer responsibility to create change in the production and design stages of products. While chapter six outlined potential spaces for change, an actual shift in practices will require the revamping of entrenched systems of economic and political activities.

This chapter concludes with an overview of the implications of the project as well as an emphasis on the importance of this research. I begin by reevaluating the project in terms of several broad themes. Second, the contributions of this research to the literature are broadly identified. Next, as this work is only an initial investigation into analysis and the understandings of relationship between social theory and waste/ing and application of

meso-level, further and future research is proposed. Finally, this dissertation ends with concluding remarks regarding the role of waste in capitalism as well as the use of waste in understanding the causes of environment degradation.

7.1. THEMES AND FOCI OF WASTE AND WASTING

This research has questioned the discursive themes and operational assumptions of waste and wasting studies in current literature, discourse, and practice. In an attempt to understand the position and function of waste in economic, political, and social structures, this research identified several important facets for the framing of critical waste analysis. Broadly, these include the understanding of waste/ing as a function or “problem” of production rather than simply a result of consumption, the importance of the materiality of waste in assessing how waste operates within the economy, and the necessity of the production of waste in capitalism. This section identifies and further discusses each of these facets.

7.1.1. Waste/ing as a function of production

In this research one of the most important assumptions challenged in waste discourse is that waste/ing is the end result of, and can be fully (if not predominately) attributed, to the process of consumption. I formulated a critique of this argument first by introducing important critical perspectives from social theory. The theorists of the Frankfurt School, in an attempt to understand what they perceived as the horrors of modern society, critically examined the role of consumption and culture in the post-World War II era. They argue that the economic system of production, or modern capitalism, is alienating rather than liberating, and repressive rather than emancipatory. Although this dissertation focuses more specifically on the work of Herbert Marcuse,

Max Horkheimer and Theodore Adorno along with many others tied to the school also provide important perspectives in the understanding of how the structure and function of capitalism both sustains and requires this oppression through consumption as a result of the structure of the system of production. This argument, therefore positions waste as a problem of production.

In addition, this research is fairly unique to the degree it utilizes this social critique from in the second chapter in conjunction with an acknowledgement of the role of production in the creation of waste in the third chapter. Here, extended producer responsibility is presented as a policy tool. The theoretical basis for this policy approach recognizes that waste is a function of production rather than consumption. Extended producer responsibility attempts to effect the production of products to increase reuse and recyclability options at end-of-life. While most products can be designed for reuse and recycling at end-of-life, it is very difficult to efficiently and effectively reuse and recycle products that have not been designed for reuse and recycling management practices. Finally, in the fourth chapter, economic analysis, grounded in eco-Marxism provides further support for the understanding of waste as a problem of production rather than consumption. The production and disposal of material is necessary for the continued expansion of capitalism further tying waste/ing to production along the same lines of those of the critical social theorists outlined in the second chapter.

Although acknowledging that waste is a problem of production rather than consumption is not a new idea, this research further supports perspectives that are often ignored or under-ignored in most waste/ing research. Seeing waste as a problem of production is of great importance to understand of the causes and associated management

practices of waste. Without this recognition, any attempts to study or manage these phenomena are problematic.

7.1.2. The importance of the materiality of waste

The focus on the critiquing of waste as a problem of consumption is revisited in chapter four with a critique of the limitations of the micro/macro dichotomy in the of the understanding of how waste is studied within the literature. Waste/ing literature is predominately associated with either micro (individual) or macro- (collective) level analysis. Study on the micro level tends to focus on the individual without understanding their positioning within larger social and economic structures. Study on the macro-level tends to be abstract towards waste, losing a connection to materiality of the objects of waste and the real consequences of their management. Following the critique of Gille (2007, 2010) and others, I emphasized how these distinctions were very limiting in understandings of the causes of, and “solutions to,” waste/ing for various reasons, including the resulting analysis of production focused rather than consumption focused literature.

To remedy this problematic distinction, I focused on the creation of a meso-level waste analysis. This analysis centered the understanding of practices of waste/ing within the process of production maintaining the importance of both the micro and the macro through a connection between the two. Using understanding of capital flows I described how the circuits of productive capital (meso-level analysis) can provide an understanding of how capital and the state react to policies of extended producer responsibility. This analysis maintains the materiality of waste, while avoiding under or over abstraction.

7.1.3. The necessity of waste in capitalism

Meso-level analysis is applied in chapter five to the case study of the implementation of the 2000/53/EC ELV Directive in Germany. Extensive interviews with automakers in Germany provided evidence from the embedded units of analysis to support this argument. In particular, these interviews provided important insights into the understanding of the implementation of this policy not usually explored in 2000/53/EC ELV Directive analysis, specifically if and why (or why not) the directive has motivated changes in production. Through this case study, the circuits of productive capital are illustrated.

It is important to see how the state works to support capital in the production process rather than supporting the social or environmental good. The result is a weakening of state policies attempting to correct for the externality of waste disposal. In the end extended producer responsibility, as a policy designed to re-design the production process, does no such thing. The application of the meso-level analysis therefore illustrates the necessary role of waste creation in capitalism as a driver of production.

Further the meso-level analysis also illustrates the resilience of capitalism in its ability to remodel its operations in response to changes in economic, political, and social factors. Recycling feeds the circuits of productive capital, not only when feedstocks from production are needed, but also when recycling is required by government regulation. It is important to note, however, that government intervention is still mediated by the productive forces of firms. The result of this is illustrated, for example, by the focus on recycling rather than reuse in the implementation of the 2000/53/EC ELV Directive in Germany

7.2. CONTRIBUTION OF THE RESEARCH

As discussed in the opening chapters of this dissertation, it is widely acknowledged by those who research waste (both within theoretical frameworks and through an interdisciplinary lens) that waste/ing is a fairly neglected focus of study. While increasingly popular as a topic and theme, waste studies and the understanding of its policy implications have not yet been combined, coordinated, or facilitated to develop holistic theories of or comprehensive frameworks for the understandings of the positioning of waste. This research, therefore, attempted to add to the literature of three specific fields: environmental political theory, environmental policy, and discourse studies in three specific facets.

Within environmental political theory and environmental policy, this research attempted to further the general conversation of the role of waste within these general disciplinary frameworks. Specifically, waste has been addressed in the field of environmental political theory, but analysis tends to occur within conjunction to other themes and topics. This research focuses specifically on waste as a lens to interpret political theory. Environmental policy literature on waste management analysis is not extensively developed and tends to assume the production of waste as given rather than question the production of it in the first place. This study, using policy analysis, attempts to ask this question.

This analysis also addressed the interdisciplinary study of waste/ing. At the moment, geographers, sociologists, and historians dominate the discard studies field. Such work, following along these lines, centers its research within political economy and political theory. This trend underscores the necessity of understanding of the capitalist

mode of production. This research, however, provides an interdisciplinary analysis of the implementation of a specific legislated policy: 2000/53/EC ELV Directive and its implementation in Germany. The literature reviewed for this research ranged from the social sciences across the subfields of engineering. Further, the theoretical basis for this research combines both critical social theory with policy analysis, two fields of literature not typically combined.

Finally, the study of the automobile provided a specific contribution to the general literature addressing environmental issues. The automobile as an object plays a unique role in social culture as well as the arrangement of cities and transportation. It is also (predominately) powered by a polluting and non-renewable resource - petroleum. The potential (or eventual need) for the shift of fuel source for automobiles (being that it appears that this mode of transportation will maintain its dominance for the near future) means that millions of vehicles may become rapidly obsolete in the near future. This fact coupled with growth in the use of the automobile in nations such as China and India increases the importance of waste management in the future. Automobiles will continue and continually become waste at end-of-life and this research assesses how, at least to this point, innovative policies have attempted to manage this process.

7.3 OPENINGS FOR FURTHER AND FUTURE RESEARCH

This dissertation is an initial step towards understanding of the positioning of waste within the domains of the political and the economic. As a first an initial step, it can open up several questions for further research. Broadly answered, these research areas include the furthering of the meso-level analysis framework, exploring this frame of

research to examine other states, and the exploration of the circuits of productive capital in the context of other industrial products.

The meso-level analysis explored for waste analysis here is a somewhat new concept, at least conceptually in the form proposed in this work. Further work in understanding the role of this analysis could potentially play in understanding the movements of waste in the context of production is necessary. The development of the understanding of the circuits of productive capital at this point is rudimentary. More specific details should be further identified and explored to more fully examine in the context of the contemporary political economy.

The research also suggests additional study of the implementation of extended producer responsibility both on the state level. For example, is the meso-level model of analysis useful for assessing policy implementation in other European Union member states? Is this model applicable to other instances of national level policies outside of the European Union? Such questions remain to be answered both through single state case studies as well as comparative cases studies. In the first chapter of this work, for example, a comparative case study examining policy implementation in Germany and the United States is proposed. While the United States uses a vastly different methods for implementing responsibility in automobile disposal, as mentioned in chapter six, the recycling and reuse rates for vehicle parts at end-of-life are quite high. Further research into why, in the context of extended producer responsibility could provide explanations of the success or lack thereof of these types of policies.

While the scope of this research is limited to vehicle recycling, future research may explore the influence of extended producer responsibility policies in targeting

production generally. As previously identified, the first iteration of European Union extended producer responsibility legislation is that of *the European Parliament and Council Directive 94/62/EC of 20 December 1994*. An analysis of this legislation does give insight into the role of productive capital:

Perhaps more critically, many believed that some kind of coordinating framework was essential to preserve recycling markets. This stemmed from experience in the early days of the Germany DSD system, in which large volumes of collected material for which domestic recycling capacity was not yet in place, were sold onto recovered material markets in neighbouring counties. The Directive would ensure all Member States were engaged in a recycling effort. (GHK, 2006b, p. 7)

Future research also may address how productive capital circuits interact with other objects to further explore the interactions among waste, production, capital and the state. The meso-level analysis may lead to a greater understanding of the functioning of waste in the economy if applied to electronics recycling as is legislated by the European Union through a policy of extended producer responsibility.

Of noted importance to this analysis, Germany specifically supports legislation, beyond the scope of the European Union, specifically through the *Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal* promulgated by the Federal Environmental Ministry (BMU). This act has established the practice of designating responsibility to waste generators (extended producer responsibility) for waste management and disposal at end-of-life. Beyond European Union regulations Germany also designates policies of extended producer responsibility for sewage sludge and biodegradable waste. There is great potential for examining a range of products within this frame of research to yield an understanding of the interaction between the state and the economy through the lens of productive capital circuits for specific products.

7.4. CONCLUDING THOUGHTS

While this dissertation opens a space for understanding and proposes areas for change in the sixth chapter, it is questionable whether or not these “openings” for change are really openings for the restructuring of the system of production if necessary or simply are solutions of sustaining environmental degradation (Luke, 2006). As emphasized by O’Connor (1991b, p. 1) “that the ecological crisis cannot be resolved without a radical transformation of capitalist production relationships; and that the economic crisis cannot be resolved without an equally radical transformation of capitalist productive forces.” This analysis of extended producer responsibility implicates the state in both supporting and maintaining the goals and objectives of capital over those goals that might be better for society and the environment. The “answer” to environmental “problems” therefore may not be found in techno-fixes or increased efficiency in production. What is necessary is the rethinking/reorganization of the system of production and thus the demands of consumption.

Finally, it is important to remember that wastes are tangible and universal. Everyone must implicitly and explicitly make the differentiation between that which is waste from that which is not. People often talk about their waste practices and they seem to understand these better, and feel more connected to waste than the more abstract and intangible problem of CO₂ emissions. Both the necessity of waste and pollution, however, are the results of the how the economy is organized. Both are the results of the operation of capitalism and in both instances the state subverts environmental and social good to support the needs of capital. Waste therefore is a useful method for the understanding of the general degradation of environment as required by the system of

production. I hope, therefore, that this subject may perhaps provide an understanding, both inside and outside of the academy, of the necessity of the waste in the economy as a starting point for understanding possible remedies for or methods to alleviate environmental degradation.

APPENDIX A

IRB Approval Letter



VirginiaTech

Office of Research Compliance
Institutional Review Board
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Blacksburg, Virginia 24060
540/231-4606 Fax 540/231-0959
e-mail irb@vt.edu
Website: www.irb.vt.edu

MEMORANDUM

DATE: August 12, 2010

TO: Timothy W. Luke, Sarah Surak

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires June 13, 2011)

PROTOCOL TITLE: Examining Vehicle Disposal Policies

IRB NUMBER: 10-641

Effective August 11, 2010, the Virginia Tech IRB Chair, Dr. David M. Moore, approved the new protocol for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at <http://www.irb.vt.edu/pages/responsibilities.htm> (please review before the commencement of your research).

PROTOCOL INFORMATION:

Approved as: **Expedited, under 45 CFR 46.110 category(ies) 6, 7**

Protocol Approval Date: **8/11/2010**

Protocol Expiration Date: **8/10/2011**

Continuing Review Due Date*: **7/27/2011**

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:

Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals / work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

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APPENDIX B

Informed Consent – English Version



Department of Political Science
531 Major Williams Hall (0130)
Blacksburg, Virginia 24061
540/231-6571 Fax: 540/231-6078

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY Informed Consent for Participants in Research Projects Involving Human

Title of Study: Examining Vehicle Disposal Policies

Principal Investigator: Dr. Timothy Luke

Co-Investigator: Sarah Surak

Email Address: ssurak@vt.edu

I. Purpose of this Research/Project

This research project will examine policy approaches targeting waste and waste disposal to make visible the implications of the European Union's End of Life Vehicle (ELV) Directive (2000/53/EC) in Germany and practices of product stewardship and extended producer responsibility on the state and federal level in the United States. Findings will contribute to the investigator's dissertation project.

Practices by producers (specifically Ford Motor Company, Honda Motor Company and Bayerische Motoren Werke Aktiengesellschaft (but potentially other producers if the opportunity is made available) will be examined through interviews conducted with corporate representatives. The purpose of the interviews is to gain knowledge as to how government disposal policies have been received and are effecting manufacturing processes.

II. Procedures

Interviews will be conducted with corporate sustainability and engineering design representatives and last approximately one hour. The semi-structured interviews will utilize open-ended questions. Responses will be recorded via an audio recording program on the investigator's computer (to aid in translation if interviews are conducted in German) and through notes taken by the investigator. Interviews will take place onsite (corporate location). After the interview the investigator or a paid transcription service will transcribe audio recordings.

III. Risks

There are no known risks associated with participation in this study.

IV. Benefits

Results of the study will be distributed to all participants. Participants will gain knowledge as to corporate responses to waste management policies in the automobile industry.

V. Extent of Anonymity and Confidentiality

Electronic information will be stored on the investigator's password protected computer. Hardcopies of related information will be stored under lock and key under the supervision of the investigator. There is no plan for destruction of research material at this time. The investigator may employ a transcription service to transcribe (and if applicable translate) the interview.

It is possible that the Institutional Review Board (IRB) may view this study's collected data for

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auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

VI. Compensation

No compensation will be provided for participation in this research project.

VII. Freedom to Withdraw

Subjects are free to withdraw from a study at any time. Subjects are free not to answer any questions or respond to experimental situations as they choose.

VIII. Subject's Permission

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent:

_____ Date _____
Subject signature

Should I have any pertinent questions about this research or its conduct, and research subjects' rights, and whom to contact in the event of a research-related injury to the subject, I may contact:

Co-Investigator

Sarah Surak
Department of Political Science
523 Major Williams Hall (0130)
Virginia Tech
Blacksburg VA 24061
Phone: (540) 231-6571
Fax: (540) 231-6078
Email: ssurak@vt.edu

Principle Investigator

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Phone: (540) 231-6571
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Email: twluke@vt.edu

**Chair, Virginia Tech Institutional Review Board for the Protection of Human Subjects
Office of Research Compliance**

David M. Moore
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, VA 24060
Phone: 540-231-4991
Email: moored@vt.edu

APPENDIX C

Informed Consent – German Version



Department of Political Science
531 Major Williams Hall (0130)
Blacksburg, Virginia 24061
540/231-6571 Fax: 540/231-6078

Einverständniserklärung für Teilnehmer in Forschungsprojekten mit Menschen

Titel der Studie: Untersuchung von Regelungen zur Altfahrzeugentsorgung
Projektbetreuer: Dr. Timothy Luke
Durchführende: Sarah Surak
Email Adresse: ssurak@vt.edu

I. Forschungszweck:

Dieses Forschungsprojekt wird politische und gesetzliche Maßnahmen im Bereich der Altfahrzeugentsorgung untersuchen, um darzustellen, welche Folgen die europäische „Richtlinie über Altfahrzeuge“ 2000/53/EG in Deutschland hat, im Vergleich zu den Konzepten im Rahmen der Produktverantwortung und der erweiterten Herstellerhaftung auf Staats- und Bundesebene in den USA, und die jeweils daraus resultierenden Verfahrensweisen der Hersteller in Bezug auf Altfahrzeug-Entsorgung. Die Ergebnisse werden in die Dissertation der durchführenden Forscherin einfließen.

Die Verfahrensweisen der Hersteller, insbesondere Ford Motor Co., Honda Motor Co. und BMW Bayerische Motorenwerke AG (ggf. auch weitere Hersteller, sofern sich die Gelegenheit ergeben sollte), werden durch Interviews untersucht, die mit den jeweiligen Vertretern der genannten Firmen durchgeführt werden. Der Zweck dieser Interviews ist es, in Erfahrung zu bringen, inwieweit die Entsorgungsregelungen der Regierungen zu den Herstellern durchgedrungen sind und den Herstellungsprozess tatsächlich beeinflussen.

II. Vorgehensweise

Die Interviews werden mit Unternehmensrepräsentanten aus den Bereichen Umwelt, Produktionsplanung oder Produktentwicklung durchgeführt und dauern etwa eine Stunde. In den halb-standardisierten Interviews werden offene Fragen gestellt. Antworten werden durch Notizen des Interviewers oder mit einem Audio-Aufnahmeprogramm aufgezeichnet und auf dem Rechner des Durchführenden gespeichert, um die spätere Übersetzung des Interviews zu erleichtern (im Falle von Interviews in deutscher Sprache). Die Interviews finden vor Ort bei den beteiligten Unternehmen statt. Im Anschluss an die Interviews wird entweder der Interviewer oder ein beauftragter Dienstleister die Audio-Aufnahmen niederschreiben.

III. Risiken

Mit der Teilnahme an dieser Studie sind keinerlei Risiken verbunden.

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IV. Vorteile

Die Ergebnisse dieser Studie werden den beteiligten Unternehmen zur Verfügung gestellt. Diese erhalten so erweiterte Erkenntnisse in Bezug auf Konzepte der Altfahrzeugentsorgung in der Automobilindustrie.

V. Zusicherung der Anonymität und Vertraulichkeit

Elektronische Informationen werden auf dem passwortgeschützten Computer des durchführenden Forschers gespeichert. Papierausdrucke entsprechender Informationen werden durch den Forschungsleiter unter Verschluss gehalten. Die Vernichtung von Forschungsmaterial ist z.Zt. nicht vorgesehen. Dem Forschenden ist gestattet, einen Dienstleister mit der Abschrift und ggf auch der Übersetzung der Interviews zu beauftragen.

Die Ethikkommission (IRB=Institutional Review Board) der Virginia Tech Universität behält sich das Recht vor, die gesammelten Daten dieser Studie zum Zwecke der Revision zu untersuchen. Die Ethikkommission ist verantwortlich für den Schutz der im Forschungsprojekt involvierten Menschen.

VI.. Entlohnung

Den Teilnehmern dieses Forschungsprojekts wird keinerlei Entlohnung gewährt.

VII. Recht zur Nichtteilnahme

Die Teilnehmer haben jederzeit das Recht, sich aus dem Forschungsprojekt zurückzuziehen. Den Teilnehmern steht es völlig frei, ob sie eine Interviewfrage beantworten wollen oder nicht, oder wie sie in einer experimentellen Situation reagieren wollen.

VIII. Einverständniserklärung des Teilnehmers

Ich habe sowohl die Einverständniserklärung als auch die Rahmenbedingungen für dieses Forschungsprojekt gelesen. Alle meine Fragen wurden beantwortet. Ich erkläre hiermit die Kenntnisnahme des vorab beschriebenen und mein freiwilliges Einverständnis zur Teilnahme:

Unterschrift des Teilnehmers

Datum

Sollte ich noch entsprechende Fragen haben zu diesem Forschungsvorhaben, seiner Durchführung, zu meinen Rechten als Teilnehmer oder aber wissen möchte, an wen ich mich im Falle einer forschungsbedingten Verletzung wenden kann, dann kann ich die auf der nachfolgenden Seite genannten Ansprechpartner kontaktieren:

Durchführender Forscher:

Sarah Surak
Department of Political Science
523 Major Williams Hall (0130)
Virginia Tech
Blacksburg VA 24061
Phone: (540) 231-6571
Fax: (540) 231-6078
Email: ssurak@vt.edu

Forschungsleiter/Projektbetreuer:

Dr. Timothy W. Luke
Department of Political Science
531 Major Williams Hall (0130)
Virginia Tech
Blacksburg VA 24061
Phone: (540) 231-6571
Fax: (540) 231-6078
Email: twluke@vt.edu

Vorsitzender der Ethikkommission:

David M. Moore
Chair, Virginia Tech Institutional Review Board for the Protection of Human Subjects
Office of Research Compliance
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, VA 24060
Phone: 540-231-4991
Email: moored@vt.edu

APPENDIX D

Permission to use Figure 3.1.

From: Rainer Lucas <rainer.lucas@wupperinst.org>
Subject: **Re: Permission for use of figure from**
Date: March 8, 2012 5:21:04 AM EST
To: Sarah Surak <ssurak@vt.edu>
Cc: Henning Wilts <h.wilts@iwar.tu-darmstadt.de>

Good morning Ms. Surak,
no problem, you can use it.

I would be appreciated to get your thesis. Please look also at the MaResS-Project, Task 2.2 and the summary (www.maress.de). We found out, that the recycling quota for ELV cannot tackle the question of a true loop cycling in material use. Coming from the end of the cycle the national instruments are limited steering globally extended material flows. See also:

Wilts, Claas Henning ; Bringezu, Stefan ; Bleischwitz, Raimund ; Lucas, Rainer ; Wittmer, Dominic:
Challenges of metal recycling and an international covenant as possible instrument of a globally extended producer responsibility. In: Waste management & research, 29 (2011), 9, S. 902-910

Kind regards
Rainer Lucas
Am 07.03.2012 um 18:10 schrieb Sarah Surak:

Dear Mr. Rainer Lucas,

I am a Ph.D. Candidate in the Planning, Governance, and Globalization at Virginia Tech, USA. I am in the process of finalizing the writing of my dissertation. My project is a critical appraisal of the implementation of the 2000/53/EC ELV Directive in Germany.

In reviewing your report *End-of-life vehicle regulations in Germany and Europe - problems and perspectives* I find Figure 1 (Material flows of ELV) quite informative. I would like to request permission to use this figure in my dissertation.

Do you own the copyright for this figure? If so may I reproduce it in my dissertation with full citation given to your work?

Thank you very much,

Sarah Surak
Ph.D. Candidate
Planning, Governance, and Globalization
Virginia Tech

Rainer Lucas
(Projektleiter)

Wuppertal Institut für Klima, Umwelt, Energie GmbH
Forschungsgruppe "Stoffströme und Ressourcenmanagement"
Döppersberg 19
D-42103 Wuppertal

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rainer.lucas@wupperinst.org
<http://www.wupperinst.org>
<http://www.dynaklim.de>
<http://www.citizen-value-report.de>

Aktuelle Veröffentlichungen:

Räumliche Bewusstlosigkeit. Metropolenkonzepte und die Folgen, in: Der Kritische Agrarbericht 2011, München, S. 164-168

Das Bauwerk als Bergwerk : Urban Mining - der neue Weg der Rohstoffbeschaffung, in: B.A.U.M. Jahrbuch 2011 - Ressourcenmanagement, S. 28-31

+++ 20 Jahre Wuppertal Institut - Jubiläumskongress: Faktor W - Wandel als Herausforderung - 30. September 2011 +++
<http://20jahre.wupperinst.org/der-kongress/>

APPENDIX E

Permission to use Figure 5.1.

From: "Souren Rainer Prof. Dr. TU Ilmenau" <rainer.souren@tu-ilmenau.de>
Subject: **AW: WG: Request for use of figures - dissertation**
Date: March 12, 2012 3:29:13 AM EDT
To: "Prof. Dr. Stefan Seuring" <seuring@uni-kassel.de>, "hw.ahn@tu-braunschweig.de" <hw.ahn@tu-braunschweig.de>, "kotzab@uni-bremen.de" <kotzab@uni-bremen.de>, "ssurak@vt.edu" <ssurak@vt.edu>
Cc: "magnus.westhaus@uni-oldenburg.de" <magnus.westhaus@uni-oldenburg.de>

Dear Sarah,

if you give full citation to our article, feel free to use any figure you'll find in it.

Best wishes

Rainer Souren

Univ.-Prof. Dr. Rainer Souren
Technische Universität Ilmenau
Fakultät für Wirtschaftswissenschaften
Fachgebiet Produktionswirtschaft/Industriebetriebslehre
Tel.: +49 3677 69-4080
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<http://www.tu-ilmenau.de/pil>

-----Ursprüngliche Nachricht-----

Von: Prof. Dr. Stefan Seuring [mailto:seuring@uni-kassel.de]
Gesendet: Freitag, 9. März 2012 21:27
An: Souren Rainer Prof. Dr. TU Ilmenau; hw.ahn@tu-braunschweig.de; kotzab@uni-bremen.de
Cc: magnus.westhaus@uni-oldenburg.de
Betreff: Fwd: WG: Request for use of figures - dissertation

Lieber Heinz, lieber Rainer,

können Sie das bitte direkt beantworten, da es Ihren Beitrag betrifft.
Um ehrlich zu sagen, bin ich nicht sicher, ob Springer gefragt werden muss, hätte da aber bei einer Abbildung keine Probleme.

Euch allen ein schönes und erholsames Wochenende,

Stefan

Von: Sarah Surak [ssurak@vt.edu]
Gesendet: Freitag, 09. März 2012 16:16
An: Herbert Kotzab; magnus.westhaus@uni-oldenburg.de
Cc: Sarah Surak
Betreff: Request for use of figures - dissertation

Dear Dr. Kotzab and Dr. Westhaus,

I am a Ph.D. Candidate at Virginia Tech, USA. My dissertation assesses the implementation of the 2000/53/EC ELV Directive in Germany.

If possible I would like to use a Figure 1: Reverse Supply Chain of End-of-life Vehicles found on page 559 of your work Research Methodologies in Supply Chain Management. Do you own the copyright for this figure? If so, may I reproduce it in my dissertation with full citation given to your work?

Thank you,
Sarah Surak
Ph.D. Candidate
Planning, Governance and Globalization
Virginia Tech

WORKS CITED

- AB Volvo. (2011). *The Volvo Group annual report 2011: together we move the world*. Göteborg, Sweden. Retrieved from http://www3.volvo.com/investors/finrep/ar11/ar_2011_eng.pdf
- AEA. (2000). *AEA-EIA letter to Vice President Gore regarding WEEE*. Washington, DC: American Electronics Association. Retrieved from <http://www.leadfree.org/AlGoreLetter7-10-00.htm>
- Alter, H. (1993). The origins of municipal solid waste: Ii. policy options for plastic waste management. *Waste Management & Research*, 11, 319–332.
- Álvarez-Gil, M. J., Berrone, P., Husillos, F. J., & Lado, N. (2007). Reverse logistics, stakeholders' influence, organizational slack, and managers' posture. *Journal of Business Research*, 60(5), 463–473.
- Andersson, A. (2011, November 24). Attribute leader, Environment. Volvo Car Corporation.
- Arsen Darnay, & William E. Franklin. (1972). *Salvage markets for materials in solid waste*. Washington, DC: Environmental Protection Agency.
- Avolio, B. J., & Bass, B. M. (1995). Individual consideration viewed at multiple levels of analysis: A multi-level framework for examining the diffusion of transformational leadership. *The Leadership Quarterly*, 6(2), 199–218.
- Ayres, R. U. (1993). *On economic dis-equilibrium and free lunch*. Fontainebleau, France: Center for Management of Environmental Resources, INSEAD.

- Bataille, G. (1988). *The accursed share: An essay on general economy*. New York, NY: Zone Books.
- Bataille, G., & Stoekl, A. (1985). *Visions of excess: Selected writings, 1927-1939*. Minneapolis, MN: University of Minnesota Press.
- Baudrillard, J. (1981a). *The system of objects*. New York, NY: Verso.
- Baudrillard, J. (1981b). *For a critique of the political economy of the sign*. St. Louis, MO: Telos Press.
- Baudrillard, J. (1998). *The consumer society myths and structures*. Thousand Oaks, CA: Sage Publications.
- Bayerische Motoren Werke. (2011). *Annual report 2011*. Munich, Germany.
- Bellmann, K., & Khare, A. (1999). European responses to issues in recycling car plastics. *Technovation, 19*, 721–734.
- Better Place. (2012). *The opportunity: economics*. Retrieved from <http://www.betterplace.com/the-opportunity-economics>
- Bilitewski, B., Härdtle, G., & Marek, K. (1996). *Waste management* (1st ed.). New York, NY: Springer.
- Bleischwitz, R., & Hennicke, P. (2004). *Eco-efficiency, regulation, and sustainable business: towards a governance structure for sustainable development*. London: Edward Elgar Publishing.
- BMU. (2010, September). General information waste management in Germany. *Waste management: general information*. Retrieved March 2, 2012, from http://www.bmu.de/english/waste_management/general_information/doc/4304.php

- BMU. (2011). *Waste management in Germany 2011: facts, data, graphics*. Bonn, Germany.
- Boehmer-Christiansen, S. (1994). The precautionary principle in Germany. In T. O’Riordan & J. Cameron (Eds.), *Interpreting the precautionary principle* (pp. 31–61). London: Earthscan Publications Limited.
- Böhm, S. (2006). *Against automobility*. Malden, MA: Blackwell Publishing/Sociological Review.
- Bohr, P. (2007). *The economics of electronics recycling: new approaches to extended producer responsibility*. der Technischen Universität Berlin, Berlin.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.
- Bruijn, T. J. N. M. de. (2005). *Industrial transformation: environmental policy innovation in the United States and Europe*. MIT Press.
- Buck-Morss, S., & Benjamin, W. (1989). *The dialectics of seeing: Walter Benjamin and the Arcades project*. Cambridge, MA: MIT Press.
- Calcott, P., & Walls, M. (2000). Can Downstream Waste Disposal Policies Encourage Upstream “Design for Environment”? *The American Economic Review*, 90(2), 233–237.
- Car Advice. (2012). Hyundai wins Germany’s Autobild Quality Report 2010. *CarAdvice.com.au*. Retrieved from <http://www.caradvice.com.au/76335/hyundai-wins-germanys-autobild-quality-report-2010/>

- Castell, A., Clift, R., & France, C. (2004). Extended Producer Responsibility Policy in the European Union: A Horse or a Camel? *Journal of Industrial Ecology*, 8, 4–7.
- Castree, N. (1999). Envisioning capitalism: geography and the renewal of Marxian Political economy. *Transactions of the Institute of British Geographers, New Series*, 24(2), 137–158.
- Castree, N. (2002). False antitheses? Marxism, nature, and actor-networks. *Antipode*, 34, 119–148.
- Cawthorne, P. (2001). Identity, values and method. *Qualitative Research*, 1(1), 65–90.
- Central Intelligence Agency. (2012). *The World Factbook: Germany*. Retrieved from <https://www.cia.gov/library/publications/the-world-factbook/geos/gm.html>
- Cerin, P., & Karlson, L. (2002). Business incentives for sustainability: a property rights approach. *Ecological Economics*, 40, 13–22.
- Chappells, H., & Shove, E. (1999). The dustbin: a study of domestic waste, household practices and utility services. *International Planning Studies*, 29(2), 267–280.
- Charles, D. (1990). East German environment comes into the light. *Science*, 247(4940), 274–276.
- Cherrier, H., & Ponnor, T. (2010). A study of hoarding behavior and attachment to material possessions. *Qualitative Market Research: An International Journal*, 13(1), 8–23.
- Clift, R., & France, C. (2006). Extended Producer Responsibility in the EU: A Visible March of Folly. *Journal of Industrial Ecology*, 10, 5–7.

- Clive Crook. (2012, February 15). Germany must decide what the European Union is for. *Bloomberg*. Retrieved from <http://www.bloomberg.com/news/2012-02-16/germany-must-decide-what-the-european-union-is-for-clive-crook.html>
- Coase, R. (1960a). The problem of social cost. *The Journal of Law and Economics*, 3, 1–44.
- Coase, R. (1960b). The Problem of Social Cost. *The Journal of Law and Economics*, 3, 1–44.
- Cooper, T. (2005). Slower consumption reflections on product life spans and the “throwaway society.” *Journal of Industrial Ecology*, 9, 51–67.
- Cooper, T. (2009). War on waste?: The politics of waste and recycling in post-war Britain, 1950-1975. *Capitalism Nature Socialism*, 20, 53–73.
- Cox, K., & Mair, A. (1989). Levels of abstraction in locality studies. *Antipode*, 21(2), 121–132.
- Crotty, J., & Smith, M. (2006). Strategic responses to environmental regulation in the U.K. automotive sector: the European Union End-of-Life Vehicle Directive and the Porter Hypothesis. *Journal of Industrial Ecology*, 10(4), 95–111.
- Dales, J. H. (1970). *Pollution, property & prices: An essay in policy-making and economics*. Toronto: University of Toronto Press.
- Daniel R Guide Jr., V., & Luk N Van Wassenhove. (2002). The Reverse Supply Chain. *Harvard business review*, 80(2), 25–26.
- Dant, T., & Martin, P. J. (2001). By car: Carrying modern society. In J. Gronow & A. Warde (Eds.), *Ordinary consumption*. New York, NY: Routledge.

- Davies, A. R. (2008). *The geographies of garbage governance: Interventions, interactions, and outcomes*. Burlington, VT: Ashgate.
- de Clercq, M. (2002). *Negotiating environmental agreements in Europe: critical factors for success*. Edward Elgar Publishing.
- de Coverly, E., McDonagh, P., O'Malley, L., & Patterson, M. (2008). Hidden mountain: the social avoidance of waste. *Journal of Macromarketing*, 28, 289–303.
- de Kadt, M. (1999). Solid waste management at a crossroads: recycling on the treadmill of production. *Capitalism Nature Socialism*, 10, 131–160.
- Degen, B. (2010). Interview/Personal Communication.
- den Hond, F. (1998). The “similarity” and “heterogeneity” theses in studying innovation: evidence from the end-of-life vehicle case. *Technology Analysis & Strategic Management*, 10(4), 529–543.
- Denzin, N. K. (2001). *Interpretive interactionism*. SAGE.
- Department of Transportation. (2006). *Transportation air quality: selected facts and figures* (No. FHWA-HEP-05-045 HEP/12-05(8M)E). Washington, DC: U.S. Government Printing Office.
- Dhanda, K. K., & Hill, R. P. (2005). The role of information technology and systems in reverse logistics: a case study. *International Journal of Technology Management*, 31(1), 140–151.
- Dopfer, K., Foster, J., & Potts, J. (2004). Micro-meso-macro. *Journal of Evolutionary Economics*, 14(3), 263–279.
- Douglas, M. (1984). *Purity and danger: An analysis of concepts of pollution and taboo*. Boston, MA: Ark Paperbacks.

- Environmental Protection Agency. (2011, June 24). Protect the environment: on the road. *Resources: protecting the environment*. Retrieved August 8, 2010, from <http://www.epa.gov/epahome/trans.htm>
- European Commission. (2000). *Directive 2000/53/EC on the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles* (No. 2000L0053 — EN — 01.07.2005 — 004.001). Official Journal of the European Union.
- European Commission. (2006). European Parliament and Council Directive (2006/12/EC) of 5 April 2006 on waste. Official Journal of the European Union. Retrieved from <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:114:0009:0021:en:PDF>
- European Commission. (2008). *Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives*. Official Journal of the European Union.
- European Commission. (2009). *Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of Regions on the Implementation of Directive 2000/53/EC on End-of-Life Vehicles for the Period 2005-2008*. Commission of the European Communities. Retrieved from <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0635:FIN:EN:PDF>
- European Commission. (2012). *Waste: end of life vehicles*. European Commission.
- European Parliament. (1996). Resolution on the communication from the Commission on the review of the Community strategy for waste management

- and the draft Council resolution on waste policy (COM (96) 0399-C4-0453/96).
- Eurostat. (2011). *How to report on end-of-life vehicles according to Commission Decision 2005/293/EC* (Directorate E: Secotral and regional statistics). Brussels: European Commission.
- Evans, M. (2001). Understanding dialectics in policy network analysis. *Political Studies*, 49(3), 542–550.
- Ezroj, A. (2010). How the European Union's Weee & Rohs Directives Can Help the United States Develop a Successful National E-Waste Strategy. *Virginia Environmental Law Journal*, 28, 45.
- Fagan, G. H. (2003). Sociological reflections on governing waste. *Irish Journal of Sociology*, 12, 67–84.
- Featherstone, M., Thrift, N. J., & Urry, J. (2005). *Automobilities*. Thousand Oaks, CA: SAGE.
- Federal Environmental Ministry BMU. (1990). *Packaging Ordinance Approved: Abandoning the Throwaway Society* (Press Release). Bonn, Germany.
- Fergusson, M. (2007). *End of Life Vehicle (ELV) Directive: an assessment of the current state of implementation by Member States* (No. IP/A/ENVI/FWC/2006-172/Lot 1/C1/SC2). Brussels: European Parliament.
- Ferrã, P., Nazareth, P., & Amaral, J. (2006). Strategies for meeting EU end-of-life vehicle reuse/recovery targets. *Journal of Industrial Ecology*, 10, 77–93.
- Fischer, F. (2003). *Reframing public policy: Discursive politics and deliberative practices*. New York, NY: Oxford University Press.

- Fishbein, B. K. (2000). Carpet take-back: EPR American style. *Environmental Quality Management, 10*, 25–36.
- Fishbein, B. K., & Azimi, S. L. (1994). *Germany, garbage, and the green dot: Challenging the throwaway society*. New York, NY: Inform.
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative Inquiry, 12*(2), 219–245.
- Forslind, K. H. (2005). Implementing extended producer responsibility: the case of Sweden's car scrapping scheme. *Journal of Cleaner Production, 13*, 619–629.
- Foster, J. B. (2000). *Marx's ecology: Materialism and nature*. New York, NY: Monthly Review Press.
- Foster, J. B., Clark, B., & York, R. (2010). *The ecological rift: Capitalism's war on the earth*. New York, NY: Monthly Review Press.
- Foster, J. B., Clark, B., & York, R. (2011). *The ecological rift: Capitalism's war on the earth*. New York, NY: Monthly Review Press.
- Freinkel, S. (2011). *Plastic: A Toxic Love Story*. Boston, MA: Houghton Mifflin Harcourt.
- Frow, J. (2003). Invidious distinction: waste, difference, and classy stuff. In G. Hawkins & S. Muecke (Eds.), *Culture and waste: The creation and destruction of value*. Oxford: Rowman & Littlefield Publishers, Inc.
- Galbraith, J. K. (1998). *The affluent society*. Boston, MA: Houghton Mifflin.
- Gareau, B. (2005). We have never been human: agential nature, ANT, and Marxist political ecology. *Capitalism Nature Socialism, 16*, 127–140.

- Gary Davis, & Lori Kincaid. (1994). *Car recycling and environmental improvement in Western Europe*. University of Tennessee Center for Clean Products and Clean Technologies.
- Gertsakis, J., Morelli, N., & Ryan, C. (2002). Industrial ecology and extended producer responsibility. In R. U. Ayres & L. W. Ayres (Eds.), *A handbook of industrial ecology* (pp. 521–529). Cheltenham: Edward Elgar.
- GHK. (2006a). *A study to examine the benefits of the End of Life Vehicles Directive and the costs and benefits of a revision of the 2015 targets for recycling, re-use and recovery under the ELV Directive*. Birmingham. Retrieved from http://ec.europa.eu/environment/waste/pdf/study/final_report.pdf
- GHK. (2006b). *Cost of compliance case study: Packaging & Packaging Waste Directive 94/62/EC*. Commissioned by the European Commission.
- Gille, Z. (2007). *From the cult of waste to the trash heap of history: The politics of waste in socialist and postsocialist Hungary*. Bloomington, IN: Indiana University Press.
- Gille, Z. (2010). Actor Networks, modes of production, and waste regimes: reassembling the macro-social. *Environment and Planning A*, 42, 1049–1064.
- Gourlay, K. A. (1992). *World of waste: Dilemmas of industrial development*. Atlantic Highlands, NJ: Zed Books.
- Gregson, N., & Crang, M. (2010). Materiality and waste: inorganic vitality in a networked world. *Environment and Planning A*, 42(5), 1026–1032.
- Gregson, N., Metcalfe, A., & Crewe, L. (2007). Identity, mobility, and the throwaway society. *Environment and Planning D: Society and Space*, 25, 682–700.

- Gregson, N., Watkins, H., & Calestani, M. (2010). Inextinguishable fibres: demolition and the vital materialisms of asbestos. *Environment and Planning A*, 42(5), 1065 – 1083.
- Gupta, M. C. (1995). Environmental management and its impact on the operations function. *International Journal of Operations & Production Management*, 15(8), 34–51.
- Hajer, M. A. (1997). *The Politics of Environmental Discourse Ecological Modernization and the Policy Process*. Oxford: Oxford University Press.
- Hang, W. (2010). Interview/Personal Communication.
- Hans, C., Hribernik, K. A., & Thoben, K.-D. (2010). Improving reverse logistics processes using item-level product life cycle management. *International Journal of Product Lifecycle Management*, 4(4), 338–359.
- Hanson, S., & Giuliano, G. (2004). *The geography of urban transportation*. New York, NY: The Guilford Press.
- Harrison, M. (1998). *The economics of World War II: six great powers in international comparison*. New York, NY: Cambridge University Press.
- Hawkins, G. (2006). *The ethics of waste: How we relate to rubbish*. Lanham, MD: Rowman & Littlefield Publishers.
- Henderson, J., Dickson, P., Hess, M., Coe, N., & Yeung, H. W.-C. (2001, August). Spatial policy Analysis. SPA Working Paper 49, School of Geography, University of Manchester.
- Hetherington, K. (2004). Secondhandedness: consumption, disposal, and absent presence. *Environment and Planning D: Society and Space*, 22, 157–173.

- Hoffman, A. J., & Ocasio, W. (2001). Not all events are attended equally: toward a middle-range theory of industry attention to external events. *Organization Science*, 12, 414–34.
- Hofstetter, P., Bare, J. C., Hammitt, J. K., Murphy, P. A., & Rice, G. E. (2002). Tools for Comparative Analysis of Alternatives: Competing or Complementary Perspectives? *Risk Analysis*, 22(5), 833–851.
- Holland, S. (1993). *Market economy: From micro to mesoeconomics*. Nottingham, England: Spokesman Books.
- Holt, D. B. (2002). Why do brands cause trouble? A dialectic theory of consumer culture and branding. *Journal of Consumer Research*, 29, 70–90.
- Horkheimer, M., & Adorno, T. W. (2007). *Dialectic of enlightenment*. Stanford: Standord University Press.
- Hristev, I. (2006). RoHS and WEEE - The New Euro- pean Directives:Do They Work and Why (Or Why Not?). *European Environmental Law Review*, 15(3), 62–74.
- Hubert, H., & Mauss, M. (1964). *Sacrifice: Its nature and function*. London: Cohen and West.
- Ingold, T. (2007). Materials against materiality. *Archaeological Dialogues*, 14(01), 1–16.
- Jaffe, A. B., Peterson, S. R., Portney, P. R., & Stavins, R. N. (1995). Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us? *Journal of Economic Literature*, 33(1), 132–163.
- Kautto, P. (2006). New Instruments – Old Practices? The Implications of Environmental Management Systems and Extended Producer Responsibility

- for Design for the Environment. *Business Strategy and the Environment*, 15, 377–388.
- Kellner, D. (1989). *Critical theory, Marxism, and modernity*. Baltimore, MD: Johns Hopkins University Press.
- Konz, R. J. (2009). The End-of-Life Vehicle (ELV) Directive: the road to responsible disposal. *Minnesota Journal of International Law*, 18, 431–457.
- Kotzab, H., & Westhaus, M. (2005). *Research methodologies in supply chain management*. Springer.
- Kroepelien, K. F. (2000). Extended producer responsibility – new legal structures for improved ecological self-organization in Europe? *RECIEL*, 9(2), 165–177.
- Latour, B. (2005). *Reassembling the social: An introduction to actor-network-theory*. New York, NY: Oxford University Press.
- Lefebvre, H. (1984). *Everyday life in the modern world*. New Brunswick, NJ: Transaction Books.
- Lefebvre, H. (2008). *Critique of everyday life*. London: Verso.
- Lenzen, M., Murray, J., Sack, F., & Wiedmann, T. (2006). *Shared producer and consumer responsibility – theory and practice*. The University of Sydney.
- Lindhqvist, T. (2000). *Extended Producer Responsibility in Cleaner Production: Policy Principle to Promote Environmental Improvements of Product Systems*. Lund University.
- Lucas, R. (2001). End-of-life vehicle regulations in Germany and Europe - problems and perspectives. *Discussion paper of the project "Autoteile perMauskick."*

- Presented at the Wuppertal Institute for Climate, Environment and Energy,
Wuppertal, Germany.
- Luke, T. W. (1990). *Social theory and modernity: Critique, dissent, and revolution*.
Newbury Park, CA: Sage Publications.
- Luke, T. W. (1997). *Ecocritique: Contesting the politics of nature, economy, and
culture*. Minneapolis, MN: University of Minnesota Press.
- Luke, T. W. (2001). SUVs and the greening of Ford: reimagining industrial ecology as
an environmental corporate strategy in action. *Organization & Environment*,
14, 311–382.
- Luke, T. W. (2006). The System of Sustainable Degradation. *Capitalism Nature
Socialism*, 17, 99–112.
- Macpherson, C. B. (1962). *The political theory of possessive individualism: Hobbes to
Locke*. Oxford: Clarendon Press.
- Mamalakis, M. (1992). Sectoral conflicts in the U.S. and the Soviet Union: a
mesoeconomic analysis. *Eastern Economic Journal*, 18(4), 421–428.
- Mamalakis, M. (1996). Poverty and inequality in Latin America: mesoeconomic
dimensions of justice and entitlements. *Journal of Interamerican Studies and
World Affairs*, 38(2/3), 181–199.
- Manheim, J. B., Rich, R. C., Willnat, L., & Brians, C. L. (2007). *Empirical political
analysis: Quantitative and qualitative research methods* (7th ed.). New York,
NY: Longman.
- Marcuse, H. (1991). *One-dimensional man: Studies in the ideology of advanced
industrial society*. Boston, MA: Beacon Press.

- Marcuse, H. (2001). *Towards a critical theory of society*. (D. Kellner, Ed.). London: Routledge.
- Marx, K. (1973). *Grundrisse: Foundations of the critique of political economy*. New York, NY: Vintage Books.
- Marx, K. (1990). *Capital: A critique of political economy*. New York, NY: Penguin Books In association with New Left Review.
- Marx, K. (1993). *Capital: A critique of political economy (Volume 2)*. New York, NY: Penguin Classics.
- Marx, K., & Engels, F. (1978). *The Marx-Engels reader*. (R. C. Tucker, Ed.). New York, NY: Norton.
- Mauss, M., & Halls, W. D. (1990). *The gift: The form and reason for exchange in archaic societies*. New York, NY: W.W. Norton.
- Mayers, C. K. (2007). Strategic, Financial, and Design Implications of Extended Producer Responsibility in Europe: A producer case study. *Journal of Industrial Ecology*, 11, 113–131.
- McKay, H. (1997). Introduction. In H. McKay (Ed.), *Consumption in everyday life* (pp. 1–12). Milton Keynes, UK: Open University Press.
- Melosi, M. V. (2005). *Garbage in the cities: Refuse, reform, and the environment*. Pittsburgh, PA: University of Pittsburgh Press.
- Merton, R. K., Lowenthal, M. F., & Kendall, P. L. (1990). *The focused interview: A manual of problems and procedures*. New York, NY: Free Press.
- Miller, D. (2001). Driven Societies. In D. Miller (Ed.), *Car Cultures* (pp. 1–33). London: Berg Publishers.

- Moore, T., Thorsnes, P., & Appleyard, B. (2007). *The transportation/land use connection*. Chicago, IL: American Planning Association, Planning Advisory Service.
- Mumford, L. (1934). *Technics and civilization*. New York, NY: Harcourt.
- Nakajima, N., & Vanderburg, W. H. (2005). A failing grade for our efforts to make our civilization more environmentally sustainable. *Bulletin of Science, Technology & Society*, 25, 170–186.
- O'Brien, M. (1999). Rubbish values: reflections on the political economy of waste. *Science as Culture*, 8, 269–295.
- O'Connor, J. (1991a). On the two contradictions of capitalism. *Capitalism Nature Socialism*, 2(3), 107–109.
- O'Connor, J. (1991b). Socialism and Ecology. *Capitalism, Nature, Socialism*, 2(3), 1–12.
- O'Connor, J. (1998). *Natural causes: Essays in ecological Marxism*. New York, NY: Guilford Press.
- O'Connor, M. (1994). The second contradiction of capitalism. *Capitalism Nature Socialism*, 5(4), 105–114.
- O'Riordan, T., & Cameron, J. (1994). *Interpreting the precautionary principle*. London: Earthscan.
- OECD. (2001). *Extended producer responsibility: A guide manual for governments*. Paris: Organisation for Economic Co-operation and Development.

- Office of Mobile Sources. (1992a). *Automobiles and Carbon Monoxide* (No. EPA 400-F-92-005). Washington, DC: U.S. Environmental Protection Agency. Retrieved from <http://www.epa.gov/otaq/consumer/03-co.pdf>
- Office of Mobile Sources. (1992b). *Automobiles and ozone* (No. EPA 400-F-92-006). Washington, DC: U.S. Environmental Protection Agency.
- OICA. (2011a). World motor vehicle production. International Organization of Motor Vehicle Manufacturers. Retrieved from <http://oica.net/wp-content/uploads/ranking-2010.pdf>
- OICA. (2011b). World motor vehicle production by countries: OICA correspondents survey. International Organization of Motor Vehicle Manufacturers. Retrieved from <http://oica.net/wp-content/uploads/hitpro-preparation.pdf>
- Opel Corporate Communications. (2012). *2011 facts and figures*. Germany. Retrieved from http://www.opel.com/experience_opel/company-information/facts-figures.html
- Packard, V. (1960). *The waste makers*. New York, NY: D. McKay Co.
- Pagell, M., Wu, Z., & Murthy, N. N. (2007). The supply chain implications of recycling. *Business Horizons*, 50, 133–143.
- Palmer, K., Oates, W. E., & Portney, P. R. (1995). Tightening environmental standards: the benefit-cost or the no-cost paradigm. *Journal of Economic Perspectives*, 9(4), 119–132.
- Paterson, M. (2007). *Automobile politics: Ecology and cultural political economy*. New York, NY: Cambridge University Press.

- Peet, R. (1989). Conceptual problems in neo - marxist industrial ceography: a critique of themes from Scott and Storper's: Production, Work, Territory. *Antipode*, 21(1), 35–50.
- Pellow, D. N. (2004). *Garbage wars: The struggle for environmental justice in Chicago*. Boston, MA: The MIT Press.
- Pickering, A. (1995). *The mangle of practice: Time, agency, and science* (1st ed.). Chicago, IL: University Of Chicago Press.
- Pigou, A. (1924). *The economics of welfare*. London: Macmillan.
- Pongrácz, E., & Pohjola, V. J. (2004). Re-defining waste, the concept of ownership and the role of waste management. *Resources, Conservation and Recycling*, 40, 141–153.
- Quiggin, J. (1988). Private and common property rights in the economics of the environment. *Journal of Economic Issues*, 22, 1071–1087.
- Rathje, W., & Murphy, C. (2001). *Rubbish! The archaeology of garbage*. Tucson, AZ: The University of Arizona Press.
- Ravaioli, C. (1993). On the second contradiction of capitalism. *Capitalism Nature Socialism*, 4(3), 98–104.
- Ray, S. (1993). Poverty and Production Conditions: Some Reflections on the Second Contradiction of Capitalism. *Capitalism Nature Socialism*, 4(1), 99–102.
- Reid, L., Sutton, P., & Hunter, C. (2009). Theorizing the meso level: the household as a crucible of pro-environmental behaviour. *Progress in Human Geography*.
- Rhodes, A. W. (1997). *Understanding Governance: Policy networks, reflexivity and accountability*. Milton Keynes, UK: Open University Press.

- Rhodes, E., Warren, J. P., & Carter, R. (2006). *Supply chains and total product systems: a reader*. Wiley-Blackwell.
- Riley, M. (2008). From salvage to recycling – new agendas or same old rubbish? *AREA*, 40, 79–89.
- Roberts, J. M. (2001). Realistic spatial abstraction? Marxist observations of a claim within critical realist geography. *Progress in Human Geography*, 25(4), 545–567.
- Robinson, W. P. (1990). Waste reduction, solid waste, and public policy. *New Mexico Law Review*, 21, 1–12.
- Rogers, H. (2005). *Gone tomorrow: The hidden life of garbage*. New York, NY: New Press.
- Royte, E. (2005). *Garbage land: on the secret trail of trash*. New York, NY: Little, Brown.
- Rudy, A. (2005). On ANT and relational materialism. *Capitalism Nature Socialism*, 16, 109–125.
- Rudy, Alan. (1994). On the dialectics of capital and nature. *Capitalism Nature Socialism*, 5(2), 95–106.
- Rugman, A. M., & Verbeke, A. (1998). Corporate strategies and environmental regulations: an organizing framework. *Strategic Management Journal*, 19(4), 363–375.
- Runkel, M. (2003). Product Durability and Extended Producer Responsibility in Solid Waste Management. *Environmental and Resource Economics*, 24, 161–182.

- S.J. de Boer. (2005, June). Meso level analysis: Part II Preparation of International Study Tours. University of Twente.
- Sachs, N. (2006). Planning the funeral at the birth: extended producer responsibility in the European Union and the United States. *Harvard Law Review*, 30, 51–98.
- Sachs, W. (1992). *For love of the automobile: Looking back into the history of our desires*. Berkeley, CA: University of California Press.
- Sbragia, A. (2010). Environmental policy: the “push-pull” of policy making. In H. Wallace, W. Wallace, & A. R. Young (Eds.), *Policy-making in the European Union*. Oxford: Oxford University Press.
- Scanlan, J. (2005). *On garbage*. London: Reaktion Books.
- Schenk, M. (1998). *Altautomobilrecycling: technisch-ökonomische Zusammenhänge und wirtschaftspolitische Implikationen* (Publications of Darmstadt Technical University, Institute of Economics (VWL) No. 1213). Darmstadt Technical University, Department of Business Administration, Economics and Law, Institute of Economics (VWL).
- Schor, J. (2004). *Born to buy: The commercialized child and the new consumer culture*. New York, NY: Scribner.
- Schor, J. B. (2007). In defense of consumer critique: revisiting the consumption debates of the Twentieth Century. *The ANNALS of the American Academy of Political and Social Science*, 611, 16–30.
- Schreurs, M. A. (2002). *Environmental politics in Japan, Germany, and the United States*. Cambridge: Cambridge University Press.

- Service, R. F. (2010). Nations Move to Head Off Shortages of Rare Earths. *Science*, 327(5973), 1596–1597. doi:10.1126/science.327.5973.1596
- Sharfman, M. P., Meo, M., & Ellington, R. T. (2000). Regulation, Business, and Sustainable Development The Antecedents of Environmentally Conscious Technological Innovation. *American Behavioral Scientist*, 44(2), 277–302.
- Siegward, K. (2010). Interview/Personal Communication.
- Simmel, G. (2004). *The philosophy of money*. New York, NY: Routledge.
- Spicer, A. J., & Johnson, M. R. (2004). Third-party demanufacturing as a solution for extended producer responsibility. *Journal of Cleaner Production*, 12, 37–45.
- Stitzhal, D. (2011). Product stewardship: Can it drive green design? *Environmental Quality Management*, 20(3), 25–41. doi:10.1002/tqem.20287
- Strasser, S. (1999). *Waste and want: A social history of trash*. New York, NY: Metropolitan Books.
- Subramanian, R., Gupta, S., & Talbot, B. (2005). Extended producer responsibility and remanufacturable product design. Michigan Ross School of Business. Retrieved from <http://deepblue.lib.umich.edu/handle/2027.42/39171>
- Szasz, A. (2007). *Shopping our way to safety: How we changed from protecting the environment to protecting ourselves*. Minneapolis, MN: U of Minnesota Press.
- Tammemagi, H. Y. (1999). *The waste crisis landfills, incinerators, and the search for a sustainable future*. Oxford: Oxford University Press.
- The Economic Times. (2012, February 8). Germany looks confident of becoming EU's economic superpower. *The Economic Times*. Retrieved from

- http://articles.economictimes.indiatimes.com/2012-02-08/news/31037900_1_euro-zone-chancellor-angela-merkel-bundestag
- Thompson, M. (1979). *Rubbish theory: The creation and destruction of value*. Oxford: Oxford University Press.
- Thoms, D., Holden, L., & Claydon, T. (1998). *The motor car and popular culture in the 20th century*. Brookfield, Vt.: Ashgate.
- Thomson, V. E. (2009). *Garbage in garbage out: Solving the problems with long-distance trash transport*. University of Virginia Press.
- Toffel, M. W., Stein, A., & Lee, K. L. (2008). *Extending producer responsibility: An evaluation framework for product take-back policies*. Harvard Business School.
- Ueta, K. (2004). Segmented society: extended producer responsibility and the cost-sharing Issue. In OECD (Ed.), *Economic Aspects of Extended Producer Responsibility* (p. 287–285). Paris: OECD Publishing.
- Ury, J. (2005). The “System” of Automobility. In M. Featherstone, N. J. Thrift, & J. Urry (Eds.), *Automobilities*. Thousand Oaks, CA: Sage Publications Ltd.
- van Rossem, C., Tojo, N., & Lindhqvist, T. (2006). *Extended Producer Responsibility: An examination of its impact on innovation and greening products*. The International Institute for Industrial Environmental Economics.
- Veblen, T. (1998). *The theory of the leisure class*. Amherst, NY: Prometheus Books.
- Verband der Automobilindustrie. (2011). The VDA – The guarantor of future mobility. Retrieved March 6, 2012, from <http://www.vda.de/en/verband/index.html>

- Waldman, M. (1997). Eliminating the market for secondhand goods: an alternative explanation for leasing. *Journal of Law and Economics*, 40, 61–92.
- Weinberg, A. S., Pellow, D. N., & Schnaiberg, A. (2000). *Urban recycling and the search for sustainable community development*. Princeton, NJ: Princeton University Press.
- White, K. M., & Hyde, M. K. (2011). The Role of Self- Perceptions in the Prediction of Household Recycling Behavior in Australia. *Environment and Behavior*. doi:10.1177/0013916511408069
- Wilson, D. C. (2007). Development Drivers for Waste Management. *Waste Management & Research*, 25, 198–207.
- Wilts, H., Bringezu, S., Bleischwitz, R., Lucas, R., & Wittmer, D. (2011). Challenges of metal recycling and an international covenant as possible instrument of a globally extended producer responsibility. *Waste Management & Research*, 29(9), 902–910.
- Wolf, S. M. (1979). Public Opposition to Hazardous Waste Sites: The Self-Defeating Approach to National Hazardous Waste Control under Subtitle C of the Resource Conservation and Recovery Act of 1976. *Boston College Environmental Affairs Law Review*, 8, 463.
- Yin, R. K. (2008). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Yin, R. K. (2009). *Case study research: Design and methods*. Thousand Oaks, CA: Sage Publications, Inc.

Yin, R. K. (2011). *Applications of case study research*. Thousand Oaks, CA: Sage Publications, Inc.