Chapter One

Introduction

This project is motivated by my long-standing interest in environmental issues, combined with a more recent interest in philosophy of technology. In particular, the project was inspired through reading Andrew Feenberg's work on the politics of technological transformation. Feenberg takes a critical theory[1] approach and suggests that various actors can shape technology for their own interests. He (1999) claims that environmentalists' struggles with technology represent "the single most important domain of democratic intervention into technology" (93), and that environmentalism, as it brings other values to bear on the technological design process, is one of the most promising terrains for accomplishing his proposed democratic rationalization of technology.

On the face of it, Feenberg's proposal sounds reasonable. Most if not all of the environmental problems facing us today are connected to technology in some way. It seems, therefore, that environmentalism at least has the potential to transform technology into less threatening forms. One problem, however, is that "environmentalism" is not a homogenous entity; rather it is a term used to describe a large and diverse collection of social movements, ideological programs, and cultural

[1] By which I mean contemporary Western Marxism, particularly as emanating from the Frankfurt Institute (School).

values. Feenberg's critical theory perspective offers a sophisticated way of analyzing and assessing the various approaches of environmentalists.

Feenberg has accomplished a tremendous amount of work with regard to a critical theory of technology—a trilogy of books (1991; 1995; 1999) and a score of articles and book chapters. Nevertheless, I believe his theory is incomplete as it stands. I draw on Feenberg's own critical theory tradition and examples from the history of technology to critique and build on his work. With regard to environmentalism, Feenberg acknowledges that there is a spectrum of views, but he does not discuss the subtleties. I use his critical theory of technology to map out the various environmentalisms and then present a case study of the toxics movement as an instantiation of his theory. At the end, I discuss the problems and possibilities of linking environmentalism, so defined, with a critical theory of technology.

Significance of Project

I earnestly believe in what I am arguing here, and my hope is that activists can fruitfully employ what I have said. Philosophy is about changing the world. Beyond this, the project should also make a scholarly contribution. Technology studies is a rapidly developing field; however, the number of works focusing on the politics of technology remains scant. In addition, although there exists a great deal of literature on contemporary environmentalism and an increasing number of works in the philosophy of technology and technology studies, there has been no systematic

attempt to bring these two disciplines together. This project attempts to fill these voids.

Background

Technology is the medium for our relationship with nature, but it is also the expression of our very lives—of who we are, what we desire, and the kind of world we wish to live in. The drive to free ourselves from nature has been the dream of Western society since the Scientific Revolution.[2] In practice, technology has been the primary means of achieving this liberation; it is the essence of the modern project.[3] However, in liberating ourselves from nature we have become increasingly dependent on second nature—the built environment. Freedom thus conceived is a double-edged sword. Technology liberates and ensnares, benefits and destroys, provides and pollutes. Looked at in this way, the "question of technology" becomes extremely momentous, not only for environmentalists, but for us all.

Critical theorists have from the beginning attempted to address the exploitative practices hidden behind progressive ideals of increased production for the benefit of all. Max Horkheimer, one of the original members of the Frankfurt School

[2] The author recognizes that the term "Scientific Revolution" is loaded, but uses it here as it is popularly understood.
[3] Of course, the question of liberation for whom always remains.

(Institute),[4] made it clear that their motivation was human emancipation through the alleviation of suffering (Kellner 1989). Critical theory is, in short, a search for an alternative modernity.

One of the most significant insights of the Frankfurt Schoolers was to link the domination of humans to the domination of nature.[5] Obviously the subjugation of nature is necessary to some degree for human subsistence. Marx also accepted this; however, the Frankfurt Schooler's called into question Marx's unqualified acceptance of the idea that technological progress equates with human progress. With their "technology-as-domination" thesis, the Frankfurt Schoolers proclaimed that the technological domination of nature ultimately led to the domination of humans—a central theme of Adorno and Horkheimer (1972 [1944]) and Marcuse (1964).

Institute members attempted to develop a new social theory that could address society, culture, and production in "totality." Addressing technology—as the knowledge, tools, and human organization required to build the worlds we want—was central to this project. Much of this came from responding to Max Weber's theory of modernity. Weber (1968) argued that the benefits of modernity (i.e., material progress) were achieved through the "differentiation" of the technological and social spheres of modern society.

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[4] What has come to be known as the Frankfurt School of critical theory originated in the Institute for Social Research (Institute) as part of the Frankfurt Institute in 1923. Key members of the Institute included Max Horkheimer, Herbert Marcuse, Theodore Adorno, Friedrich Pollock, Erich Fromm, and Leo Lowenthal (Kellner 1989: 12).

[5] This is not unique to the Marxist tradition. Social ecologists and ecofeminists, for example, also make this connection.

Feenberg argues against the idea that technology necessarily leads to a differentiation of technological and social spheres. He claims that certain actors maintain control of the technological design process for their ends. Democratizing the design process, and reversing the process of differentiation can therefore achieve technological transformation. However, even if humans, and not technology, are responsible for the dominating and destructive consequences of technology, we are still left with the question of how to best achieve the goal of a more sustainable and just world.

I use Feenberg's critical theory of technology to assess the four major strands of environmentalism—mainstream reform, wilderness preservation, radical, and environmental justice.[6] Although there are isolated examples of progress (e.g., improved water quality), many of the "headline" environmental problems—acid rain, rain forest depletion, species extinction, global warming, and ozone depletion—continue unabated. More significantly, basic living conditions (e.g., potable water) for the majority of the world's population continue to deteriorate. Granted, one can get lost in endless bantering over the interpretation of scientific data with regard to these problems,[7] but in the end the fact remains—mainstream environmentalism is failing to achieve the goal of a more sustainable world (however conceived). I argue that this failure is due to three reasons: an ineffective legislative approach, an

[6] The justification of for this breakdown will be discussed in chapter four.
[7] See, for example, the controversy over the work of Lomborg 2001.

overemphasis on the preservation of non-human nature, and a failure to effectively engage technology.

Langdon Winner (1990), explains how for good or ill, the world we now live in is both materially and ideologically framed by technology:

> Our whole way of life is increasingly technologically mediated. You can't separate society from technology any more, or politics from technology, or culture from technology. The life around us is very largely influenced by choices in design and shape of technology (1).

Increasingly, we find ourselves embedded in large technological systems; many of these systems, such as fossil fuel burning electric power, are inherently non-sustainable (Hughes 1983). Any theory of eco-social transformation must, therefore, engage these systems to recreate the built environment.

Stereotypes of environmentalists must be overcome. Environmentalists are frequently portrayed as falling into one of two camps (Pepper 1996). Techno-optimists, or technocrats, believe that whatever environmental problems exist can be resolved with existing or future technologies. Many policy-makers and mainstream environmentalists would likely fall into this camp. Neo-Luddites, on the other hand, tend to blame technology, either directly or indirectly, for environmental problems. Radical environmentalists, such as the Environmental Liberation Front (ELF) who advocate doing away with modern technology altogether, are representative of this genre. But neither celebrating technology nor dismissing it out of hand is the answer. We are deeply embedded in technological systems that are often destructive to the

environment; consequently, these systems must be transformed, if we are to move toward more sustainable societies.

Until recently (after 1970), environmentalists focused primarily on the impact of humans on non-human nature, that is, on protecting "wilderness." This is no longer practical. If the sole focus of environmentalists is preserving islands of pristine wilderness, even these so called paradises will eventually sink into the mire of development. How we live in the built environment effects non-human nature as well.

Focusing on non-human nature without considering human nature creates a paradox: it perpetuates the culture-nature dualism that lies at the root of our maladaptive relationship with nature. Moreover, exalting wilderness reproduces the same values that environmentalists seek to reject. It feigns responsibility for the way we live in the nature that we do inhabit (Veak 2002). The irony is that "only a people whose relationship to the land was already alienated could hold up wilderness as a model for human life in nature" (Cronon 1996: 80). We must instead concentrate on the "middle-ground" where we live. Fortunately, some environmentalists are engaging technology and attempting to transform the middle-ground (i.e., the built environment) for the better. In the process, activists expose the inequalities hidden within the built environments in which we live.

Environmental problems are social problems; they cannot be separated without slighting either humans or nature (Commoner 1990). Sparked by issues of class, race, and gender, the new emphasis—commonly known as environmental

justice—has caught the attention of the entire environmental movement. Although justice has become a central issue within environmentalism, efforts to resolve injustices involving race, class, and gender are frequently ineffectual because they do not address the technological (material) forms of these injustices. I will argue that there exists a connection between these concretized injustices and environmental degradation. The built environment, not only as physical structures but as social organizations, must be addressed. To do so requires a sophisticated theory of the technology-society relationship.

Literature Review

My claim is that there is virtually no literature that attempts to assess environmentalism and technological transformation from a critical theory perspective. Feenberg (1999) has dabbled in it, along with Luke (1997; 1999), and Marcuse (1972; 1992); none of these, however, go in depth into the issue in the systematic way I am attempting here. Langdon Winner is one of the few contemporary theorists who have attempted to address technology from an explicitly Marxist perspective. However, Winner's *Autonomous Technology* (1977) is primarily a summary on the emergence of technocracy; and although his *Whale and the Reactor* (1986) is specifically directed at environmental issues, it does not offer a clear prescription for socio-technological transformation. His central point is that we have become trapped in large technological systems that take on their own imperatives (i.e., autonomous

technology), and that these systems necessitate choices that self-perpetuate and exclude the influence of human values.

Winner advocates a "political theory of technology" because technology is now the primary means of constructing our society. Along with Mackenzie and Wajcman (1985), Winner (1985, 1986) argues that artifacts embody politics/interests. His conclusion is that we must think long and hard about the systems we choose because they can be either constraining or flexible in terms of future choices. At the end of the day Winner provides little guidance on how these choices can be achieved, other than to say that the process should be more "democratic."

Marxist historians of labor and manufacturing, such as David Noble (1977; 1984), have made some contribution to understanding how the interests of dominant actors become embodied through the design process. However, the more detailed sociological studies of technological design that have proliferated in the last fifteen to twenty years (Mackenzie and Wajcman 1985; Bijker, Hughes, and Pinch 1987; Bijker and Law 1992) are, by and large, politically benign. Feenberg is the one theorist who attempts to combine the conclusions of these detailed studies with a critical theory perspective. Hence, this project centers largely on his work.

But as useful as it is, there are problems with Feenberg's suggested critical theory of technology. I use his own critical theory tradition, and examples from the history of technology to expose the weaknesses in his theory. My central argument is that Feenberg places far too much emphasis on the micro-level of technological design, ignoring the rationalizing and homogenizing effects of entrenched systems.

Although there are many primary and secondary sources pertaining to Western Marxism, there are few that specifically address technology. Marx (1906) himself did not see technology as particularly relevant to social transformation, and usually wrote about it in relation to the labor process or automation. The majority of secondary materials on Marx and technology are either histories of technology, such as David Noble (1984), or pertain to the issue of technological determinism, such as Leo Marx (1994).

Some of the most pertinent aspects of Marx and technology, such as his critique of the commodity form, only became evident with the emergence of the Frankfurt School and critical theory. The majority of their key texts are readily available in single author collections, or anthologies, such as Arato and Gebhardt's *The Essential Frankfurt School Reader* (1982). Many have also been reprinted in Leftist journals, such as *Telos*.[8] In addition, there are a number of excellent secondary sources on the Frankfurt School (Jay 1973; Held 1980; Kellner 1989; Bronner 1994; Wiggershaus 1994) that discuss the origins of critical theory, as well as their views on technology.

I support the theoretical discussion of technology with concrete examples from the history of technology. Specifically, I examine the development of railroads and electrical power systems in the United States. Chandler (1977) and Nye (1990) are especially useful, although there are many others. Primary sources are not

[8] In addition, Douglas Kellner is involved in a project to publish The Collected Works of Herbert Marcuse (1998; 2001).

necessary for this section because the point of these histories—that in modernity technology tends to coalesce into systems and move toward differentiation—is not especially contentious (although I recognize that the details of this progression are).

In terms of mainstream reform environmentalism and wilderness preservationism, there are a plethora of sources available that address both the history (e.g., Nash 1967; Hays 1987; Sale 1993) and their current state (e.g., Norton 1991; Dowie 1996; Schabecoff 1993; Rotham 1998). There are also several good sources that discuss the emergence of radical environmentalism (Manes 1990; Scarce 1990; List 1993; Zakin 1993). However, Robert Gottlieb's *Forcing the Spring* (1993) is the only comprehensive history of environmental justice (although there are many case studies). Urban poor and minorities have historically born the burden of pollution, both where they live and where they work. These inequalities persist, and have given rise to the present global environmental justice (EJ) movement on which there is a growing body of literature (Pulido 1996; Schlosberg 1999; Szasz 1994; Wenz and Westra 1995; Camacho 1998; Faber 1998).

Since the EJ movement links environmental issues to broader social issues and focuses on resisting specific technologies (e.g., toxic waste incinerators), it offers one of the more promising means of engaging technology. To illustrate the workings of grassroots EJ, I present a case study of the toxics movement. This section relies most heavily on primary sources. I use works written by activists (Gibbs 1998), guidance literature from grassroots-based organizations, and personal interviews (Appendix). Funding from a Virginia Tech Graduate Research Development Award

enabled me to visit the Center for Health, Environment and Justice (CHEJ) in northern Virginia where I interviewed[9] one of their grassroots organizers and surveyed their guidance literature.

Methods

My approach is primarily philosophical; however, it is also historical in the sense that I use examples from the history of technology to support my argument and discuss the ideas of critical theory and environmentalism in a historical fashion. For the most part, I accept the "constructivist" and "systems" approaches used by historians of technology, but I recognize that these methods are by no means universally accepted. They are, however, utilized by some of the most prominent scholars in the field—Thomas P. Hughes and David Nye. One could also say that my approach is sociological in that the subject of my examination is a contemporary social movement (i.e., environmentalism) and because an interview plays a central role in my case study of the toxics movement. I should also point out that my approach is both normative and descriptive, in that sense that I use Feenberg's critical theory of technology to both analyze and critique[10] environmentalism.

Scope

[9] The interview was prearranged. Questions were prepared beforehand, but only the subject and purpose of the interview were discussed with the interviewee.
[10] By "critique," I mean both a critical analysis, or review, and a normative assessment. It is both normative and descriptive.

There is a substantial amount of work being done in the philosophy of technology. Hence, some justification for taking a critical theory approach is necessary. One reason is that the majority of this work does not address the transformation or democratization of technology. Rather, it deals more with metaphysical and epistemological issues, such as trying to define technology (Ihde 1990) or explaining the nature of technological knowledge (Pitt 1992). This is not to say that these issues are unimportant to the goal of technological transformation or that others have not suggested ways of transforming technology. Albert Borgmann (1984), Joseph Pitt (2000), and Richard Sclove (1995), to name a few, all address technological transformation.

I have, however, chosen to limit this project to the Western Marxist tradition, primarily because it centers on the work of Andrew Feenberg, who is tied directly to this tradition. Feenberg studied with Herbert Marcuse at the University of California at San Diego, completing a dissertation on Georg Lukács.[11] In addition, he served as the editor of the Leftist journal, *Telos*, for a number of years, and was actively involved with the New Left (and the French May Events of 1968) until he decided to focus exclusively on scholarship. This, in conjunction with his explicit attempt to develop a "critical theory" of technology, justifies the focus on critical theory in general, and on his work in particular.

[11] Marcuse was an original member of the Frankfurt Institute, and Lukács played a central role in the shift to Western-philosophical Marxism, or what is now known as critical theory.

But in addition to this, the Marxist theoretical tradition offers a number of conceptual advantages for the project at hand:

- In that dialectical processes are the basis for all life, a dialectical (Marxist) interpretation of the human-nature relationship resonates well (Parsons 1977)
- Marxists view technology as an extension of the human body for the purpose of appropriating nature and fulfilling needs
- Marxism relies heavily on a constructivist view of "nature" and the concept of "limits" in nature (Hughes 2000).
- Later Marxists made the important distinction between "true" and "false" needs (Marcuse 1964)
- Beginning with Marx, there is an underlying assumption that technology embodies politics

In sum, the Western Marxist tradition taken as a whole offers an extremely useful approach to understanding the relationship between humans, nature, and technology. And while some theorists, such as Feenberg and Winner, have touched on the need to connect environmentalism with technological transformation, this has not been sufficiently explored.

Outline of Chapters

Chapter two is devoted to laying out Feenberg's critical theory of technology. I frame Feenberg's agenda as a response to, or critique of, modernity in the tradition of the Frankfurt School. To provide the necessary background, I briefly discuss Max Weber's theory of modernity and the Frankfurt School's response. Although the Frankfurt School's portrayal of technology was rather foreboding, some of them did offer prospects for liberation. Marcuse, in particular, attempted to spell out a theory of emancipation—a "technique of liberation." I follow Marcuse with Habermas's reply but devote the majority of the chapter to Feenberg's work, focusing especially on his theory of primary and secondary instrumentalization. I conclude by summarizing the insights gained from Feenberg's work, claiming that his theory of instrumentalization is particularly useful for analyzing micro-level engagements with technology.

In chapter three I critique and build on Feenberg's work. I argue that although the Frankfurt School's portrayal of technology as an autonomous-rationalizing force is somewhat exaggerated, it is largely correct. I draw on Feenberg's own tradition to argue that modernity is characterized by the differentiation of technological and social spheres. I support this with examples from the history of technology, railroads and electrical power systems in particular. These systems provide examples of "technology as ideology" and as "social process," and they demonstrate that over time technological systems tend to take on their own imperatives and become more deeply entrenched (and differentiated). I argue that what Feenberg's theory needs is a

theory of commodification, which I borrow from the recent work of Paul B. Thompson.

Having outlined Feenberg's critical theory of technology, I move on to discuss environmentalism, in chapter four. I examine various "environmentalisms" through the lens of Feenberg's critical theory of technology. I argue that of the four main strands of environmentalism—wilderness preservation, radicals, mainstream reform, and grassroots EJ—the last resonates most with Feenberg's theory. Grassroots EJ takes a direct-action approach and focuses on transforming the built environment where people live. That is, like Feenberg's critical theory of technology, EJ focuses on socio-technological transformation.

To illustrate the grassroots EJ approach, I provide a case study of the toxics movement in chapter five. I begin with a discussion of the Love Canal incident (1978), where the toxics movement originated. From there, I move on to examine the background theory and strategies employed by the Center for Health, Environment and Justice (CHEJ). I argue that the methods employed, and particularly the strategies used by grassroots-umbrella organizations such as CHEJ, are analogous to Feenberg's theory of instrumentalization.

The final chapter is more normative, as I discuss the details of how a critical theory of technology can enhance environmentalism as I have defined it. My conclusion is that Feenberg's suggestion of linking environmentalism with a politics of technological transformation is viable. There are, however, some difficult hurdles that must be overcome. One crucial issue is that grassroots activists have a fairly

naïve view of technology which prevents more sweeping transformations. In short, they fail to see that the risks threatening their communities stem from maladaptive production, and that their own over-consumptive lives fuel the problem. A critical theory of technology opens the black-box of "pollution" to expose the interconnections between production and consumption. I argue that at the center of this problem lies the issue of human need—that is, who defines it, and how?

Chapter Two

Feenberg's Critical Theory of Technology

Feenberg's project is best understood as a vision and a path toward alternative modernities. He reasons that if modernity as we know it is established through a process of rationalization, then alternative rationalizations are necessary in order to create alternative modernities. "There are ways of rationalizing society that democratize rather than centralize control" (Feenberg 1999: 76). Viewed in this way, environmentalism offers paths toward alternative modernities. He believes that the current modernity is characterized by a particular rationality—a technological code—and that this rationality has been embodied in the technological designs of modern society. Democratizing technology means expanding technological design to include alternative interests and values.

Feenberg offers both a theory of technological transformation—a democratic rationalization of technology—and a critique of the existing cultural horizon. His (1999) approach is therefore two-pronged: one focusing on the micro-level of technological design and the second focusing on the meta-level of worldview, or hermeneutic (i.e., the presuppositions and biases inherent in our present relations with technology) (202). This two-level approach seems appropriate; to be successful local

movements, whether environmental, technological, or other, must be coupled with overarching meta-level critiques of society.

This chapter is intended primarily as an explication of Feenberg's politics of technological transformation. However, before moving on to a discussion of his work, some understanding of the context of his ideas is necessary. Feenberg's work is largely a response to, or continuation, of Max Weber's theory of modernity. As such, he both critiques and builds on his Frankfurt School predecessors who were also responding to Weber. He draws most heavily from Herbert Marcuse and Jürgen Habermas to formulate his "critical theory of technology." I will therefore begin with a brief discussion of Weber's theory of rationalization and then move on to the Marcuse-Habermas debate over technology.

Max Weber and the Frankfurt School

Weber (1968) claimed that the process of modernization fueled by capitalism's emphasis on formal rationality necessarily led to a "differentiation" between technological and social spheres. In short, the progress of modernity was achieved at the expense of moving away from the personal (substantive) relations of traditional societies to the impersonal (formal) relations of modern society. Weber (1968) distinguished between formal and substantive rationality. He considered a system to be formally rational "according to the degree in which the provision for needs, and which is essential to every rational economy, is capable of being expressed

in numerical, calculable terms" (85). Conversely, systems that "apply certain criteria of ultimate ends, whether they be ethical, political, utilitarian, hedonistic, feudal, egalitarian or whatever, and measure the results of economic action … against these scales" (85) are substantively rational. According to Weber, capitalism adopts formal rationality to achieve increased control, the end of which is total bureaucracy—the "iron cage" (Marcuse 1968: 203). Driven by human needs, capitalism attempts to maximize production through formal rationality. The more rationalized a system becomes the more it produces. End of story. There cannot be a normative assessment of such a value-neutral system.

The degree to which Frankfurt Institute members[12] borrowed from the work of Weber cannot be overemphasized. Max Horkheimer, Hebert Marcuse and others drew heavily on Weber's ideas of "rationalization" and the "iron cage" of capitalism, focusing especially on his concept of "formal rationality," or instrumental reason (Held 1980: 65). There are, however, significant differences between Weber and the Frankfurt School.

Like Weber, Adorno and Horkheimer held that in the context of capitalism, "useful" translates into economically valuable (Held 1980: 153). However, they (1972 [1944]) attributed the rise of instrumental reason to the Enlightenment thinkers who claimed that only that which is useful in nature is valuable. "Rational" was co-opted by capitalism to find the most efficient means of producing a product. Science

[12] Key members of the Institute included Max Horkheimer, Herbert Marcuse, Theodore Adorno, Friedrich Pollock, Erich Fromm, and Leo Lowenthal (Kellner 1989: 12).

and technology provided tools for carrying out the prescribed program (Tar 1977: 80). Although the drive for domination was not new to the Enlightenment, it was the employment of new tools of domination -- science and technology -- that made the Enlightenment program unique. Technology as instrumental reason was one of the primary means of instilling this domination (Held 1980: 170).

Horkheimer and Adorno (1972 [1944]) argued that the subjugation of nature led to the subjugation of humans: "what men want to learn from nature is how to use it in order wholly to dominate it and other men" (4). While it is true that developments in science and technology led to improved methods of quantifying, calculating, and organizing nature, at the end of the day, these tools were turned back on humanity to provide new ways of ordering and rationalizing society. Reason was therefore not the road to emancipation hailed by Enlightenment thinkers, but a new method of shackling humanity.

To achieve the capitalist goal of maximized production, total bureaucratic control is the inevitable outcome—the "iron cage." Weber, however, did not view the establishment of the apparatus of administrative bureaucratic control negatively. For him, it is simply the way things are (i.e., fate). There is no intentionality or subjectivity in the capitalist machine. Marcuse (1968), on the other hand, argues that what Weber calls fate is actually domination, because in fact someone, or some group, chose a particular "fate" over another:

> Who decrees the fate? Industrialization is a phase in the development of men's capacities and needs, a phase in their

> struggle with nature and with themselves. This development can proceed in very different forms and with very different aims; not only the forms of control but also those of technology and hence of needs and of their satisfactions are in no way "fatal," but rather *become* such only when they are socially sanctioned, that is, as the result of material, economic, and psychological coercion (214).

Weber's formal-technical rationality is actually a political rationality, because "coercion" constrains the choice of technology. If technology is a social-political choice, then a "technique of liberation" could be chosen over a "technique of domination" (Marcuse 1968: 225).

Marcuse's Technique of Liberation

Marcuse's (1964) proposal for liberation involves three elements: a critique of the existing technological consciousness, a new technique of pacification, and a new subject, or agent. He (1964) claims that the contradictions created by the hyper-rational, technological society open the door for critique (225). This is not a belief in the inherent breakdown of economic conditions as scientific Marxists argued. Marcuse, instead, argues that late capitalism generates enough negative externalities to make us question the rational nature of the given technological society. This is

where critical theory comes in; it "strives to define the irrational character of the established rationality" (Marcuse 1964: 227).

Marcuse (1964) claims that the choice of an alternative technology is limited by: (1) the "stuff" of nature, however defined, as it confronts the subjective interpreter, and (2) the form of interpretation in a given cultural historical context (218). In other words, both the inherited technological context and the pre-established technological consciousness represent important constraints on technological choice. Alternative historical projects must be at least imaginable for the possibility of "an ingression of liberty into historical necessity" (Marcuse 1964: 221). However, alternatives are difficult to achieve because of the hegemony of the few who have control over the productive process. The possibility of alternatives, Marcuse (1964) claims, depends on this ingression of freedom by "men who comprehend the given necessity as insufferable pain, and unnecessary" (222).

The issue of agency is crucial; someone must be capable of acting. Although not particularly hopeful, Marcuse believes that the best opportunity for alternatives lies with the excluded, or marginalized. That is, the revolutionary standpoint rests with the outsiders, and outcastes, such as people of color, the persecuted, and the unemployed. All they need is the consciousness to act (Marcuse 1964: 256).

Although it is a given that nature must be pacified for human existence, this mastery can be either repressive, or liberatory (Marcuse 1964: 236). Marcuse suggests a new "technique of pacification" to replace the established technology of

domination. Significantly, Marcuse believes that science and technology can be redirected to non-destructive paths. Because he ties problems such as war, violence, and environmental destruction together into a "technique of domination" (or domination of rationality), they can all be addressed through a transformation of this technique—a transformation of technology itself. From this perspective, resolving environmental destruction becomes part of a larger, more totalizing project. Marcuse (like Feenberg) therefore sees environmentalism as one path for moving toward liberation—a pacified existence (alternative modernity).

To accomplish this, Marcuse claims that technology must be redefined as an "art of life" (338). He (1978) sees the development of the aesthetic dimension as central to this liberation project. Beauty must become a form of freedom. "Rather than being the handmaiden of the established apparatus, beautifying its business and its misery, art would become a technique for destroying this business and this misery" (Marcuse 1964: 239). And with the emancipation of Nature comes the simultaneous emancipation of human senses. We are thereby liberated to experience gratification from Nature in a multitude of new ways (Marcuse 1972). Humans, however, must begin to appreciate Nature for its own sake— "a subject with which to live in a common human universe" (Marcuse 1972: 60). Marcuse thus suggests a reversal of the much-discussed domination of nature, not through doing away with technology but by refashioning it as a "technique of liberation."

Habermas' Reply

Jürgen Habermas fundamentally opposes Marcuse's call for a new technology. According to Habermas (1968), technology is essentially the unburdening of needs that are rooted in human nature through purposive-rational action (i.e., work). Technology is who we are—the innate faculty of "purposive-rational action" is what enabled humans to control their environment and set themselves apart from the rest of nature. According to Habermas (1968), Marcuse's suggested "new" technology is therefore impossible:

> as long as the organization of human nature does not change and as long therefore as we have to achieve self-preservation through social labor and with the aid of means that substitute for work, we could renounce technology more particularly *our* technology, in favor of a qualitatively different one (87).

For Habermas, suggesting a new technology is as absurd as suggesting a new human species. Liberation cannot be achieved by transforming technology because technology simply cannot be altered.

Habermas claims that Marcuse is misguided in his call for a revision of the human-nature relationship with an alternative mediating technology. Marcuse (1992) envisions humans as inter-subjectively engaging nature via a new technology. The problem is that Marcuse fails to distinguish between two different types of action. According to Habermas (1968), the human-nature relationship is necessarily

governed by “purposive-rational action,” and what Marcuse is advocating is actually “communicative action” (88).

Habermas admits that the technological rationalization of society is problematic but that technology itself is not the cause. The source of the trouble lies in the tension between the spheres of work and communication. The domination of work, or purposive-rational action, over traditional forms of communication is a defining feature of the modern period (Habermas 1968: 96). Rational-bureaucratic institutions arising from the Enlightenment eventually replaced traditional societies which were governed by social institutions and symbolic interaction. Capitalism played a central role in this transformation by demanding improved means of quantification and calculation. Habermas therefore frames the rise of modernity similar to Weber, the difference being that he does admit that this is problematic.

Like Weber (and the Frankfurt School), Habermas (1968) sees technology as instrumental rationality; specifically, he defines technology as "scientifically rationalized control of objectified process" (57). However, his approach to resolving the problem is somewhat different: "*Rationalization at the level of the institutional framework* can occur only in the medium of symbolic interaction itself, that is, through *removing restrictions on communication"* (1968: 118). Emancipation is therefore achieved not through a new technology as Marcuse advocates but by limiting purposive-rational subsystems through “new zones of conflict” (Habermas 1968: 120). The central problem is not technology itself because, again, technology cannot be changed.

Instead, Habermas (1968) claims that technologically induced domination can only be overcome "by the development of a political decision-making process tied to the principal of general discussion free from domination" (61). A "technocratic consciousness" co-opts the political decision making process, such that social problems are necessarily reduced to technological problems (1968: 64). Technocrats frequently attempt to structure society such that only "scientific" and "technological" problems exist, as the case of Love Canal illustrates (chapter five). Obviously this is not always possible, because irrationalities continue to emerge in the face of increasing attempts to rationalize society.

Although Habermas largely agrees with Marcuse and the rest of the Frankfurt School in their characterization of technology as instrumental rationality, his view is suspect for attempting to tie technology to human nature.[13] He opens himself up to standard critiques against essentializing by connecting technology to an ontological claim (Kellner 1984: 332). To his credit, Habermas suggests a way around Marcuse's problem of containment[14] by separating the spheres of work and communication. However, in doing so Habermas appears to reify Marx's original distinction between

[13] Post-modernists have convincingly argued against any notion of a universal essence of human nature.

[14] Marcuse (1964) collapses the social and technological relations, a framing that created an almost inescapable problem. That is, his conception of a one-dimensional society that co-opts any and all negations made the possibility of escape seemingly impossible.

the forces of production on the one hand, and the relations of production on the other.[15]

Andrew Feenberg's Critical Theory of Technology[16]

Feenberg (1999) argues against what he calls "essentialist" theories[17] of technology whether rooted in human nature (Habermas) or tradition (The Frankfurt School). Although he draws heavily from Marcuse and Habermas to formulate his critical theory of technology, he attempts to eliminate their essentialist base. He claims that this tendency to essentialize is due primarily to an overemphasis on the meta-level of culture. In the case of Habermas, his sidelining of the technology-society relationship to focus on the meta-level of language and communication had the same effect. This is even more obvious in the case of the case of Frankfurt Schoolers, like Marcuse, who framed technology as an autonomous, rationalizing force acting hand-in-hand with capitalism to produce agentless workers/citizens of a one-dimensional society. Their infatuation with Weber's concept of rationalization, combined with the philosophical shift in Marxism,[18] predisposed the Frankfurt School to focus on consciousness, or ideology. As discussed below, the crux of the issue is

[15] Marx divides the labor process into the "productive forces," the machines, tools, and worker skills; and the "productive relations," the forms of property and power relations in society (O'Connor 1998: 35).
[16] Portions of the following have been adapted from a previously published work (Veak 2000).
[17] According to Feenberg (1999), essentialist philosophies of technology originated with Heidegger and were further developed by the Frankfurt Schoolers.
[18] The failure of a proletariat led revolution initiated a shift in Marxist thought in the early twentieth century. In short, this involved a moving away from Scientific Marxism, or economism, to a more philosophically oriented theory.

whether or not technological progress necessarily leads to a differentiation between technological and social spheres, as Weber argues.

Feenberg's central point is that technology can only be misconstrued as an autonomous-rationalizing force if the contingency evidenced at the micro-level of design is ignored. In short, there is no "essence" of technology, according to Feenberg. Recent work in technology studies supports the idea that technology can only be defined contextually and locally by the particular technology-society relationship.

The Social Construction of Technology

Feenberg (1999) argues that scholarly interpretations of the social construction of technology (SCOT) establish convincingly that the technology-society relationship is not unilinear (78-83). He broadly conceives SCOT to include social constructivists, contextualist historians of technology, and actor-network theorists.[19] Feenberg has been criticized for too readily accepting the reified packaging of this extremely diverse school (Stump forthcoming). Although this may be true, his use of SCOT as a whole seems appropriate. These studies do in fact reveal a number of significant insights about the technology-society relationship.

First, SCOT theorists tend to avoid essentialist portrayals of technology altogether. Instead, these theorists permit the analysis to contextually define

[19] There have been a number of edited volumes on the SCOT since the current rage began in the early 1980's (Mackenzie and Wajcman 1985; Bijker, Hughes, and Pinch 1987; Bijker and Law 1992).

technology.[20] The end result of such analysis, however, has much to do with the particular approach. Historical approaches tend to be rather "loose" or even messy, while sociological and actor-network approaches tend to frame technology within a particular model (Bijker and Law 1992: 7). Feenberg takes away from this the notion of "interpretive flexibility," that is, the idea that the design process is composed of a number of competing interpretations.

Secondly, SCOT studies reveal that technology can be analyzed at three different levels, or layers: the *artifact* itself, the activities and *processes* that generate the artifact, and finally the *knowledge* necessary to develop the artifact (MacKenzie and Wajcman 1985: 3). Sociologists typically approach the study of technology through a bottom-up micro-analysis of case studies from which generalizations, or models, are derived. This approach is clearly in contrast to the Frankfurt School's conception of technology, which, as discussed above, tends to be more of a macro-level analysis.[21]

Finally, SCOT sheds light on the nature of the relationship between technology and society. The first question that must be addressed in this regard is whether or not technology should be considered distinct from, or outside of, society.

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[20]The degree to which the sociologist "hides" behind this mask of impartiality is an immensely important topic in itself. It is not, however, the focus of my discussion here. See Hans-Georg Gadamer (1975) and/or Paul Diesing (1991) for a discussion of "interpretation" and the social sciences.

[21]On the surface, it may appear that critical theory's discussion of technology is more explicitly "political." However, many sociologists of technology would no doubt agree that their choice of a model for analysis is also politically motivated. Latour and Woolgar (1979), for example, specifically rebut the claim that their sociological analysis is simply "bourgeois sociology of science" by attempting to pull the rug (i.e., science itself) out from under the appeals for a radical (Marxist) science. I am not so sure.

Bijker and Law (1992) refer to this as the "interactive" perspective. If technology is portrayed as distinct from society, then three possible relationships exist: technology determines society; society determines technology; or technology determines technology.[22]

On the other hand, if technology and society are collapsed into one "seamless web," in which there is no inside or outside, the relationships between the various elements of society and technology become much more contingent and emergent in character (Bijker and Law 1992: 8). According to John Law (1987), a seamless web of social, political, and economic factors meshes together to form a complete technological system (e.g., electric power with all the related sub-systems and artifacts constructed to accommodate this system). Such approaches focus on key "system builders," such as Thomas Edison's role in the development of electric systems (Hughes 1989).

There is also the question of whether the technology-society relationship is heterogeneous or homogenous. The conclusions drawn about this relationship differ greatly depending on how this question is answered. As discussed above, because they accepted Weber's differentiation thesis, the Frankfurt Schoolers conceived of technology as having a rationalizing, or homogenizing, effect on society. Actor-network theorists employ a seamless web model to analyze artifact construction,

[22] This bifurcation is no doubt one of the primary reasons why Marx has been frequently mislabeled as a technological determinist. That is, his distinction between the forces of production (technology) on the one hand, and the relations of production (society) on the other, no doubt provokes such an interpretation.

where many elements interact to produce an artifact: *"the stability and form of artifacts should be seen as a function of the interaction of heterogeneous elements as these are shaped and assimilated into a network"* (Law 1987: 113). The social is therefore not a privileged element that operates outside the system, driving it in a deterministic fashion but simply one element within the system. John Law (1987) explains:

> Thus the point is not ... to emphasize that a particular type of element, the social, is fundamental to the structure of the network; rather it is to *discover* the pattern of forces as these are revealed in the collisions that occur between different types of elements, some social and some otherwise (114).

Actor-network theory extends the constructivist notion of symmetry[23] to all the elements of the network—social, economic, political, technical, natural, and scientific (Law 1987: 130).

To summarize, Feenberg (1999) draws on SCOT to demonstrate that the design process is not deterministic. There is a significant degree of contingency, difference, or, "interpretive flexibility" in society's relationship with technology (76). SCOT studies help to expand the definition of technology to include the knowledge and processes that go into the development of particular artifacts. And finally, the

[23] The concept of symmetry has its origins in the "Strong Program" of the sociology of scientific knowledge. The idea is that the analyst must suspend truth or falsity in order to give all perspectives a fair analysis (Bloor 1976).

idea of a seamless web is helpful in overcoming essentialist characterizations of technology as an autonomous-rationalizing force. Including all the elements in the analysis offers a more complete explanation.

While SCOT reveals a number of insights about the technology-society relationship, Feenberg (1999) rightly points out its deficiencies. SCOT is too narrowly focused on the development of particular technological artifacts, or systems (11). Wanting to include all elements in the analysis is understandable; however, SCOT has taken the concept of symmetry too far in an attempt to level the playing field. SCOT ignores the larger issue of how particular design choices are made over other choices, which, as Feenberg argues, is an inherently political question.[24] He (1999) claims that since technology can never be removed from a context, it can never be neutral (213). Technological design is inherently political; consequently, the observed constraint on design choice is not some essence of technology but evidence of the hegemonic control of the design process by privileged actors.

Feenberg's Critical Theory of Technology

With Weber as a backdrop, Feenberg combines the insights from SCOT with the critical theory of Marcuse and Habermas to arrive at his own "critical theory of

[24] On the other hand, Feenberg has been criticized for his over emphasis on the social/political (Stump forthcoming), a point I discuss in more detail below.

technology." He believes Marcuse was correct to argue that technology is to a large extent socially shaped and that the form of technology is a political choice. The problem with Marcuse's perspective is that he does not acknowledge the contingency within the technologically dominated one-dimensional society. It is either all or nothing—a technique of domination or a technique of liberation. This is what leads Marcuse to argue that transformation must come from "outside" the system; those within the one-dimensional society are simply too constrained to act. Feenberg (1999) rejects this appeal to outsiders as the basis for transforming society (153). He (1995) argues that the goal is "not to destroy the system by which we are enframed but to alter its direction of development through a new kind of technological politics" (35). The goal, in other words, is to steer the system from within through subtle hybridizations not mass revolution.

With modifications, Feenberg employs Habermas's (1984; 1987) model of a democratic speech community as the means for liberating technological design choice from hegemonic constraints. According to Feenberg (1995), Habermas is mistaken to conceive of technology as instrumentally neutral (79). Technology can never be neutral because it cannot be separated from a particular cultural context. SCOT studies demonstrate that actors are able to successfully shape design choice for their own non-instrumental ends. Groups of actors can influence the design process to accommodate a variety of interests. However, Feenberg (1999) claims that the struggle over design choice is rational (105).

Whereas Habermas argues for the exclusion of rationality from the lifeworld of communicative action, Feenberg brings rationality into Habermas' vision of a democratic community to arrive at his suggested "democratic rationality." Contra Habermas, this process of transforming technology must take place within the social (Feenberg 1995: 81). The possibility exists to choose rationally more liberating technological designs that further the various interests of the community of actors. As Feenberg (1999) states, "there are ways of rationalizing society that democratize rather than centralize control" (76).

There is, however, an obvious tension between the *contingency* observed at the level of design choice, and the *constraints* placed on design by the larger cultural-political milieu. Feenberg (1999) characterizes this tension as the "ambivalence" of technology, which he conveys in the following two principles:

1. Conservation of hierarchy: social hierarchy can generally be preserved and reproduced as new technology is introduced. This principle explains the extraordinary continuity of power in advanced capitalist societies over the last several generations, made possible by technocratic strategies of modernization despite enormous technical changes.

2. Democratic rationalization: new technology can also be used to undermine the existing social hierarchy or to force it to meet needs it has ignored. This principle explains the technical initiatives that often

> accompany the structural reforms pursued by union, environmental, and other social movements (76).

Feenberg admits that advanced societies concretize power through technologically mediated organizations that prevent their citizens from meaningful political participation. Focusing on this aspect of culture led the Frankfurt School to characterize technology as an autonomous, rationalizing force. The problem is that they ignored the existence of the second principle of "democratic rationalization." Feenberg (1999) is optimistic that democratic rationalization can overthrow this entrenched power "from 'within,' by individuals immediately engaged in technically mediated activities and able to actualize ambivalent potentialities suppressed by the prevailing technological rationality" (105). The crux of his proposal centers on the degree to which democratic rationalization can override capitalism's conservation of hierarchy.

He claims (1999) that "strategic" actors are able to concretize their particular biases in to the technological designs. These biases stem from:

> aspects of technological regimes which can best be interpreted as direct reflections of significant social values the 'technical code' of the technology. *Technical codes define the objects in strictly technical terms in accordance with the social meaning it has acquired.* These codes are usually invisible because, like culture itself, they appear self-evident (Feenberg 1999: 88).

According to Feenberg, control over design choice is not always economically motivated, as Marxists frequently argue. That is, the utilitarian efficiency of the

market is not always the motivating factor. Frequently, the aim is to either de-skill workers, or for management to maintain operational autonomy (Feenberg 1995: 87). A centralized-hierarchical power structure is perpetuated because technological designs (codes) are intentionally chosen to maintain operational autonomy. Feenberg (1995) therefore admits that although technocratic power is foundationless and contingent, it nevertheless has a "unidirectional tendency" (92).

Despite this fact, he believes that it is possible for "tactical" actors to subvert the established technical code through their own democratic rationalizations. Feenberg provides examples of what he considers successful democratic rationalizations of technology, such as the struggle over the Internet (1999) and AIDS activist's reform of the FDA drug approval process (1995). Although the Internet was originally designed for the transmission of data, interpretive flexibility enabled a multitude of users to shape the Internet for their own uses (Feenberg 1999: 126). In the case of AIDS treatment, activists collectively challenged traditional medicine's technocratic view of treatment. Activists forced a dialogue with research scientists, and the FDA. In the end, they successfully altered the entrenched government bureaucracy to gain access to experimental medicines, which in turn led to significant advancements in treating AIDS (Feenberg 1995: Ch. 5). Feenberg sees environmentalist's engagements with technology as having the same potential.

Primary and Secondary Instrumentalization

The tensions between the principles of the "conservation of hierarchy" and "democratic rationalization" can also be discussed in terms of instrumentalization. Feenberg (1999) distinguishes between "primary instrumentalization" in which the functional, reifying aspects of technology are emphasized, and "secondary instrumentalization" where objects are actually constituted into their particular social contexts. Primary instrumentalization is therefore analogous to Weber's (and the Frankfurt School's) discussion of technology as formal rationality. Habermas, in agreement with Weber, sees differentiation (i.e., between technological and social spheres) as the unavoidable consequence of technological modernization. Feenberg in contrast argues that this differentiation is more apparent that real. That is, looking at technology at the meta-level makes it appear that technology has a differentiating effect.

He characterizes primary instrumentalization with four moments. Technology has the effect of *decontextualizing* entities from their original context. The qualities of objects are *reduced* to quantifiable terms so that they can be easily controlled with the established laws of science and technology. Those in control seek to *position* themselves strategically in order to more easily exert their power. All of this assumes a degree of *autonomization*, or distancing, between those in control and the objects being controlled (Feenberg 1999: 203—204).

Feenberg suggests that primary instrumentalization and the process of differentiation can be overcome not through containment, as Habermas argues, but through a process of subversive, or secondary, instrumentalization. The overall thrust

of this level is to concretize elements that have been decontextualized through the process of primary instrumentalization. Feenberg offers four secondary moments to counter the reifying moments of primary instrumentalization. Actors must seek to *systematize* elements that have been decontextualized.[25] In response to the

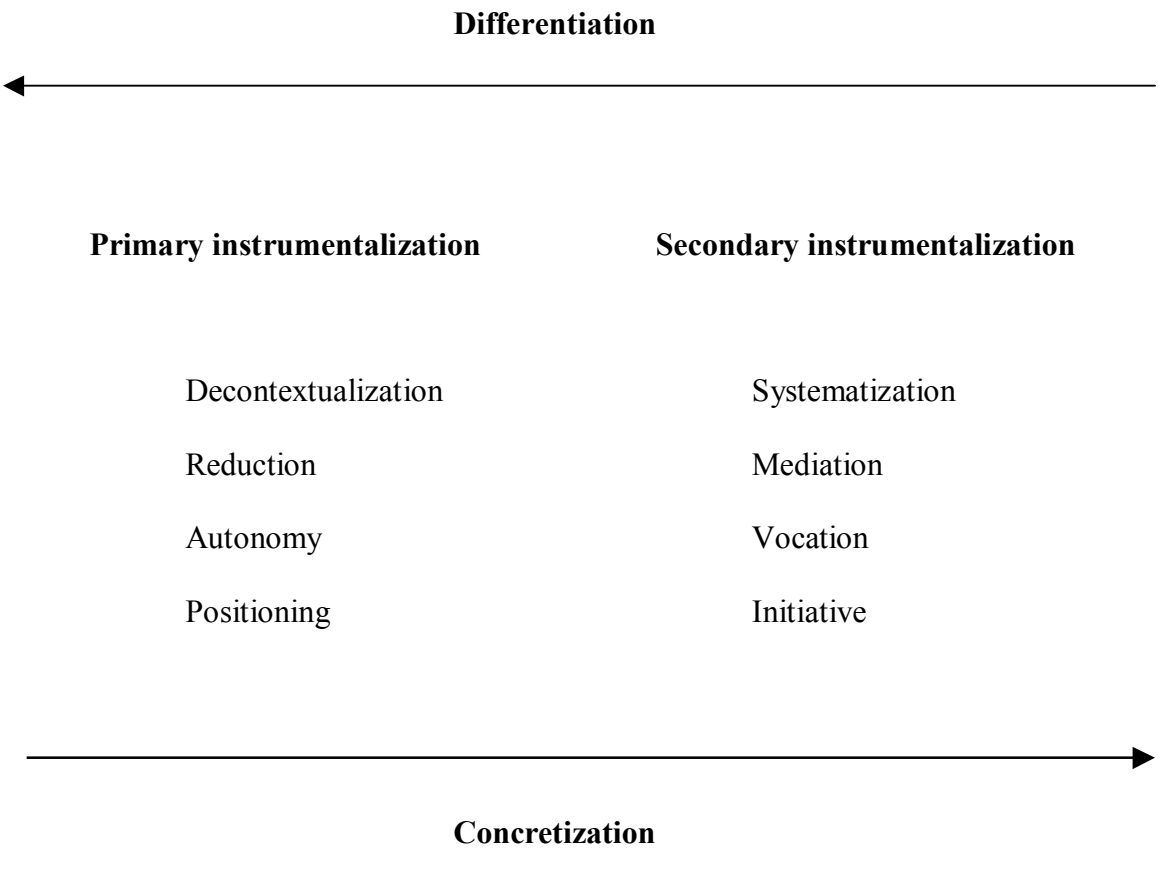

Chart 1: Feenberg's Theory of Instrumentalization[26]

[25]Feenberg claims that this is roughly analogous to Bruno Latour's discussion of "enrolling" actors into networks. Latour (1988), for example, uses Pasteur's development of germ theory to illustrate how system builders enroll actors into their networks.

[26] Used by permission of author (Feenberg 1999: 221).

reductionism of primary instrumentalization, actors can re-instill objects with secondary qualities. Aesthetic and ethical *mediations* are added to technological objects when recontextualized. Autonomization can be overcome through *vocation*, or the actual way in which users engage technologies. Although the distancing effect of technology is real, actors can make choices in the way in which they actually employ technologies. Finally, tactical actors can exert their *initiative* to counter the positioning of strategic actors attempting to control them through technology (Feenberg 1999: 205—207). The potential for combating and overcoming primary instrumentalization with secondary instrumentalization will be further discussed in the case study of the toxics movement (chapter five).

Technological Consciousness

In order to move toward concretization the hegemony constraining design choice must be exposed through what Feenberg calls a "reflexive-hermeneutic technology." What is needed, according Feenberg (1999), is a theory of cultural change: "A new culture is needed to shift patterns of investment and consumption and to open up the imagination to technical advances that transform the horizon of economic action" (98). He draws on a number of intellectual tradition—hermeneutics from Heidegger, cultural theory from Foucault and Baudrillard, and critical theory—to reveal how the interests of certain actors achieve and maintain control of the design choice process.

Feenberg argues that the essentialist view of technology as inherently differentiating is actually a product of a reified technological consciousness. He (1999) compares this consciousness to Marx's discussion of commodity fetishism in which commodities are reified and treated as actually existing, autonomous entities:

> The fetishistic perception of technology similarly masks its relational character: it appears as a non-social instantiation of pure technical rationality rather than as a node in a social network. Essentialism theorizes this form and not the reality of technology (211).

The technological consciousness reifies the split between primary (functional) and secondary (all other) qualities. Feenberg, however, argues that this division follows from modern society's exaggerated emphasis on functionality. In its extreme form this begins to look much like modernity's hyper-rationalization of society through capitalism's emphasis on utilitarian efficiency. It is possible, however, to describe technological objects using both functional and social language, which is what Feenberg means by contrasting the moments of primary and secondary instrumentalization.

The examples he provides, such as the Internet, concretely illustrate this possibility. Of particular note (the motivation for this project) is Feenberg's claim (1999) that environmentalists' struggles with technology represent "the single most important domain of democratic intervention into technology" (93). He believes that environmentalism, as it brings other values to bear on the technological design process, is one of the most promising terrains for evoking this change.

Summary and Conclusions

Feenberg offers a number of insights on the politics of technological transformation. One of his most worthwhile suggestions is to move the locus of transformation inside the social. Marcuse's appeal to outsiders is probably the greatest flaw in his theory of liberation; there is no inside or outside. If a group is confronted by a technology, then they are part of that system even though they may only experience the negative aspects. Viewing technology as a social process helps actors to see themselves as the living material of these systems. To the degree that they are able, actors possess the ability to shape systems for their ends. However, they must be able to determine who is in control. Feenberg's critical theory of technology is helpful in this respect.

Given a particular technological design, Feenberg suggests the questions of who wins, and who loses? Looking for the "technological code," or signature, of those in control of the design process is useful in identifying the locus of power and where pressure should to be applied. Related to this is his distinction between "strategic" and "tactical" actors. Distinguishing those that wish to maintain the status quo (positioning) of a technological system from those that have a stake in changing the system (initiative) is vital in moving toward transformation. And his distinction between primary and secondary instrumentalization provides a language in which to discuss these changes.

Finally, Feenberg's employment of SCOT to overcome the one-sidedness of essentialist philosophies of technology is also valuable. SCOT studies provide evidence that a great deal of contingency exists early on in the design process. However, they also indicate that as time goes by technological systems move toward "closure," at which point transformation becomes much more difficult. One obvious point that follows from this is that actors have a greater opportunity to alter technological systems if they become involved early in the design process. In short, if some amount of contingency exists either because the system is still in the early stages of development or because of a crisis, then Feenberg's characterization seems applicable.

However, there are problems with accentuating the pre-closure period, as Feenberg does. The examples that he uses are either not entrenched (e.g., the Internet) or less dependent on material technology (e.g., AIDS activism). This should motivate activists to be more proactive, but realistically citizens tend to become motivated once they are confronted by an existing (entrenched) system.[27] As I will discuss below, thinking about this issue with regard to the technologies confronting environmentalists brings a host of problems to bear. I am therefore less sanguine about the notion of contingency, and the prospects for democratic rationalization than Feenberg.

[27] In addition, when activists do attempt to pre-empt a questionable technology (e.g., GMF), it usually leads to endless debates over scientific data. The toxics movement (chapter five) dramatically illustrates this struggle.

In sum, Feenberg's critical theory of technology is practical both for assessing the merits of a movement (e.g., environmentalism) and for guidance on transforming technology. However, as I have indicated, there are problems with his proposal. It should be clear by now that one of the most important points with regard to technological change is the tension between the micro-level of design and the macro-level perspective of system (and ideology). That is, as technological systems expand they appear to increase differentiation between the technological and social spheres. Feenberg clearly believes that this tendency is overstated and that it can be overcome. From Feenberg's own critical theory tradition, and from the history of technology, I will argue otherwise.

Chapter Three

Critiquing and Expanding Feenberg's Theory

Feenberg's effort to move beyond the Frankfurt School's conception of technology as instrumental rationality is commendable, although the degree to which they were "essentializing" technology is subject to debate. The key works of Adorno and Horkheimer (1972 [1944]), and Marcuse (1964) could be read as attempts to historicize rather than essentialize the emergence of technological domination. Moreover, Feenberg also appears to essentialize at times, for instance, by invoking ahistorical moments in his theory of instrumentalization (Stump forthcoming). Nevertheless, his central point that the Frankfurt School ignored the design-level of technological engagements is clearly relevant, as are the insights gained from SCOT.

Eliminating determinism and admitting contingency does not mean, however, that anything goes or that people are necessarily free to make choices about technology. While Feenberg (1999) acknowledges that capitalism is the greatest hindrance to a more liberatory politics of technology—"Technological design must be freed from the profit system" (57)—he nevertheless argues that this hindrance can be overcome through the struggle of various local movements over technology (Note especially his suggestion about environmental movements). Granted, these movements sometimes succeed and are no doubt significant to the participants.

However, it is not enough to simply celebrate these small victories, if the goal is to significantly transform the face of modernity into more sustainable and just societies. One can question this goal altogether, but if Feenberg's critical theory of technology is to meaningfully connect with environmentalism, then some such goal must be put forth.

Feenberg seems to argue that technological transformation is successful if it is democratic (as he defines it). However, focusing on particular relations with technology obscures the fact that the context of capitalist hegemony and the process of rationalization thwart the majority of local "victories."[28] Although Feenberg (1999) acknowledges this hegemony, he is clearly optimistic about the prospects for overcoming:

> But are such movements truly emancipatory? Do they simply deepen our involvement with technology in accord with the dystopian logic of modernity? … And it is true that advanced societies enroll their members in ever wider technical networks which, as dystopian pessimists claim, do indeed constrain behavior significantly. But absolute opposition to technology leaves no room for practical criticism and reform. Even as technology expands its reach, the networks are themselves exposed to transformation by the individuals they enroll (128).

[28]I am in no way discounting the achievements of social reform movements over the last one-hundred plus years. My point of contention is primarily concerned with the actual prospects of technological reform, and where exactly this reform is headed.

In the long run, emphasizing the local obfuscates the hegemony that on the one hand Feenberg acknowledges, but on the other offers no real strategy for addressing other some vague notion of a "reflexive technological hermeneutic." Simply arguing that technology is not inherently differentiating, and that we must re-contextualize the functional aspects with the social is not sufficient.

I want to challenge the efficacy of his proposal for a "democratic rationalization" of the design process. In focusing on the micro-politics of local struggles over technological design, Feenberg tends to minimize the rationalizing tendencies of technologically-based capitalism. Technology, at least as it has been manifested in modernity, does appear to have a differentiating effect. The history of technology reveals that the "essentialist," or "dystopian" view (e.g., the Frankfurt School) of "technology as rationality" is to some degree accurate. A brief examination of the development of two large technological systems—railroads and electric power—serves to illustrate. Importantly, these examples from the history of technology resonate in many ways with the Frankfurt School's (and Weber's) characterization, which Feenberg flippantly dismisses as essentialist and dystopian. Viewed in this way, Feenberg's own critical theory tradition becomes a critique against him.

Technology as Rationality

As long as humans have engaged in trade, individuals and institutions have attempted to manipulate markets for their own benefit. By the nineteenth century, however, technology began to play a central role in shaping markets. Where formerly markets were regional and fairly isolated,[29] they became connected through the new transportation and communications systems. Economies of scale increased to such an extent that power shifted away from particular companies, or markets, to those that controlled the technological systems.

Alfred Chandler,[30] in his well-known work *The Visible Hand* (1977), details the emergence of the modern business enterprise, which he claims "was the organizational response to fundamental changes in processes of production and distribution made possible by the availability of new sources of energy and by the increasing application of scientific knowledge to industrial technology" (376). Most significantly, Chandler argues that the modern business enterprise was largely established through technological developments in transportation and communication. Beginning in anti-bellum United States, he traces the transition from family, or entrepreneurial capitalism, to present day managerial capitalism.

The enormous expansion of railroads that occurred in the later half of the nineteenth century contributed to increased competition among the various railroad companies. Railroad managers established cartels in an effort to coordinate the

[29] I recognize that "world trade" has long existed, but the nature and extent of this trade has increased exponentially.
[30] William Cronon's (1991) analysis also supports the rationalizing effects of railroads, although his analysis is more explicitly Marxist and limited geographically (Chicago area).

markets and control competition (Chandler 1977: 123, 143). The modern business structure, or what Chandler calls managerial capitalism, emerged during this period. Railroads internalized many business processes (e.g., distribution, manufacturing, and accounting) to create multi-unit firms. Because owners could no longer oversee all the operations of these complex multi-unit enterprises, management diverged from ownership for the first time. Once this shift occurred specialization among management rapidly increased (Chandler 1977: 87). Hierarchical structures were then established to coordinate and control the complex task of safely and efficiently distributing goods and people (Chandler 1977: 107).

In an effort to control distribution interconnections, management went on a system-building spree in the 1880s. More miles of track were laid in this decade than in any other. By 1900 railroads had increased their hegemony over the distribution market by gaining control of all the major steamship lines (Chandler 1977: 188). With the advent of refrigeration technology, distribution capabilities increased even further. Companies began to incorporate more and more business activities into a single enterprise. In a sense, the market had been literally internalized by the multi-unit corporations. As such, the market came under the control of the "visible" hand of the corporate managers (Chandler 1977: 285-86). By 1917, the modern industrial enterprise, which integrated mass production and mass distribution within a single business form, was largely in place as the dominant form. After World War I it was simply a matter of perfecting the structure and clarifying the roles of middle and top managers (Chandler 1977: 454, 456).

Where the railroads were the cornerstone of the U.S. economy from 1835-1890, electricity filled this role from 1890-1935 (Nye 1990: 169). Electrification served to increase the economies of scale initiated by railroad and communication companies. The rationalizing effects of electric power are evident both in the evolution of the systems themselves and in their affect on society. In terms of the former, Thomas P. Hughes' (1983) comparison of electric systems illustrates.

Hughes examines the development of electric power in Chicago, London, and Berlin and shows how initially each system was shaped by the particular context. Chicago was dominated by laissez-faire economics, Berlin by heavy government regulation, and London by parochialism—each giving a unique face to electricity. London held out the longest against standardization with its extremely fragmented and non-standardized conglomerate of electrical systems. Nevertheless, Hughes (1983) claims that by the 1930s all three systems were homogenized (or rationalized) by the system demands of utilitarian efficiency.[31] Hirsh (1999) argues convincingly that, in the case of the U.S., a group of managerial elites further entrenched the system with decisions intended to maintain the status quo.[32] Viewed in this way, electric power represents a clear instance of the differentiating, and rationalizing effect of technology.

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[31]While Hughes (1983) admits that "load factor" was a technological limitation driving the direction of the electrical utility industry, he also concedes that the industry would look considerably different in a society that did not count "capital cost." That is, if the industry was driven by values other than utilitarian efficiency and the "bottom-line" of the market (463).

[32] In the same book, Hirsh explains how this hegemony was overcome through various circumstances. This will be discussed in more detail in the final chapter.

Both railroads and electric power illustrate that system growth was not driven entirely by economic considerations. Chandler, for example, stresses that although financiers were important to this growth, top managers determined the overall strategy and mode of operation. The growth of railroad systems was clearly driven by a desire to expand markets; however, the economies of scale increased to such an extent that enormous administrative-managerial machines were necessary to maintain their operation. Once established, the managers began making decisions that would preserve their power; it was not simply about money in other words. The same thing occurred in the case of electric power with the establishment of public utility systems. The technological imperatives and the objectives of the system managers become mutually reinforcing. This is roughly analogous to the Frankfurt School's discussion of the administrative takeover of society under Nazism, or state capitalism.

Nazism and the lack of a proletariat revolution led to a questioning of the traditional Marxist emphasis on the centrality of economics. Friedrich Pollock's (1982 [1941]) essay on state capitalism convinced a number of Frankfurt Institute members that the means of maintaining hegemony was not simply economic. Pollock claimed that the threat of collapse was no longer immanent under the Nazi system, which he termed "state capitalism." While orthodox Marxists argued that capitalist economic systems necessarily led to collapse, Pollock suggested that Nazi Germany had managed to overcome these contradictions through a system of controls.[33]

[33] Another Institute member, Franz Neumann, countered Pollock's thesis, claiming that the highly administered society created by National Socialism was merely a façade. Complete chaos lay under

Granted, capitalism may have facilitated the development of fascism, but once achieved it seemed to take on a life of its own, no longer subject to traditional Marxist economic analysis. Under state capitalism the priority of economics became subjugated to the state administrative apparatus. The imperative, therefore, was to address the bureaucratic machine that created and maintained this hegemony (Dubiel 1985: 81).

In sum, the development of railroads and electric power support the idea that technological systems have a tendency to move toward autonomous, rationalizing systems. The drive for efficiency and standardization created enormous systems of a uniform nature in both instances. Indeed, in order to expand it seems almost inevitable that systems move in this direction. Although technological determinism is certainly an overstatement, there is a sense in which technological systems build up momentum as they expand (Hughes 1989). There comes a point at which large technological systems take on their own imperatives (Winner 1977). That is, in order for the system to expand and increase efficiency (i.e., to make the product/service increasingly affordable), then clearly these imperatives will come to dominate the decision making of the system managers. According to Weber (1968), the differentiation between the technological and the social spheres facilitates this

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the surface of the highly structured Nazi machine. This debate between Pollock and Neumann lead to a division among Institute members (Held 1980: 63). Adorno and Horkheimer sided with Pollock, which may explain the overt pessimism of their later work (1972 [1944]). More significantly, the debate instigated a concerted effort to understand the techniques of Nazism and fascism.

growth. Importantly, as systems gain momentum and became more entrenched the prospects of transformation appear to diminish.

Technology as Social Process

In terms of electric power's wider impact on society, one of its most significant effects was in the factory. The massive distribution network created by railroads and telegraphs led indirectly to mass production technologies[34] (Chandler 1977: 240). Dramatically increasing the availability of raw materials and fuel sources (i.e., coal) opened the door for technological innovations in production (Chandler 1977: 240). According to David Nye (1990), "Electricity opened up new possibilities for restructuring the factory, by making changes in both the environment and the process of production" (187).

The effects on the factory and the productive process itself were profound. During the period of electrification (1890-1940) production increased three hundred percent (Nye 1990: 186). This, in turn, led to changes in the way factories were managed but also to determined responses on the part of the workers (Noble, 1977: 55). From the worker's perspective, the changes brought about by electricity were both good and bad. On the one hand, electricity provided a cooler and safer work environment; however, it also helped to establish the automated assembly line which

[34] What mass production is, and when it was actually achieved is a subject of considerable debate. Hounshell (1984) argues that the key ingredient in mass production—interchangeability of parts—was not achieved until after 1885 (122).

dramatically altered worker life both inside and outside the factory. Automation led to deskilling and a more fluid work force. Like the parts of a machine, workers became interchangeable. As a result, women and children frequently took over positions traditionally held by men, although at considerably lower wages (Nye 1990: 210).

However, the primary cause of worker dissatisfaction was not the deskilling, or the grueling tedious work but the loss of control over the rate of production. Worker autonomy had long been an issue, but until the introduction of the fully automated assembly lines, workers had managed to exert some sense of agency by controlling the speed of production. Assembly lines, however, forced workers to follow the dictates of the line speed, which was faster and continuous (Nye 1990: 190).

Of greater consequence to the worker, assembly lines enabled tasks (and workers) to be highly regulated. Machines were only half of the assembly line equation; the workers themselves the other. The workers' bodies were conditioned to conform to the automated processes. Thus began the Scientific Management[35] movement, the essence of which was the streamlining of human action in the production process. Frederick Taylor (1967 [1911]) is credited with initiating this movement in which engineers shifted from managing and manipulating machines to

[35] Also known as "Taylorism."

managing and manipulating people (i.e., workers).[36] Taylor focused primarily on time and task studies to determine the "optimal" production rate (i.e., literally how fast the worker could function at a sustained rate) (Noble 1977: 82).

However, Taylor's conception of work (and humans) was overly simplistic. His rigid methods led to a number of worker uprisings including a strike at a government arsenal at Watertown in 1911. These events ended with the banning of Scientific Management methods in federal arsenals altogether (Noble 1977: 272). As a result of these conflicts with workers, later analysts gave more consideration to the psychological aspects of the workers. The objective shifted to determining ways of eliciting consent and cooperation from workers[37] (Noble 1977: 274).

Taylorism represents one of the most extreme examples of technology as social process and supports the idea that "like every other social process, technology is alive. People—particular people in particular places, times, and social contexts—are both the creators of modern technology and the living material of which it is made" (Noble 1977: 167). Under Taylorism, the workers were not only organized around assembly lines, their very movements were quantified and forced to conform to the machines. They became the machines. Moreover, the later shift in emphasis to obtaining worker consent is analogous to the Frankfurt School's discussion of technology as ideology.

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[36] Antonio Gramsci's (1971) discussion of Fordism and Taylorism provides an early Marxist critique of the modern industrial form.

[37] This was essentially the beginning of industrial psychology.

Technology as Ideology

One of the central ideas of the Frankfurt School was that an ideology of technology supports the hegemony of particular forms of technology. Horkheimer (1982[1941]) argued that fascists transformed and co-opted the Enlightenment thinker's conception of reason: "the new order of fascism is reason revealing itself as unreason" (46). Where reason had once represented critique and skepticism, it became just the opposite under fascism:

> The process which hardens men by breaking down their individuality—a process consciously and planfully undertaken in the various camps of fascism—takes place tacitly and mechanically in them everywhere under mass culture, and at such an early age that when children come to consciousness everything is settled (Horkheimer 1982[1941]: 41).

Where Enlightenment thinkers, such as Kant and Locke, had hailed reason as a means of preserving the individual, the rationality of domination instituted by National Socialism paradoxically led to the destruction of the very individual that reason was intended to protect.

Fascist techniques of control became so ingrained that they appeared natural. "Rational" equated to conformity with the system (Marcuse 1982 [1941]: 148). "Technology as rationality" mystifies the process by which humans are brought into conformity. Horkheimer (1982[1941]) claimed that this process created a

"technological veil," where the "tattered veil of money has been replaced by the veil of technology" (44).[38]

Marcuse elaborates on these themes in his discussion of a "one-dimensional society." According to Marcuse (1964), technology has been co-opted through a political choice to establish the present form—"technological rationality" (154-55). Late capitalism contains its antithesis, or negation, through this technological rationality. He (1964) argues that reason manifested through technology serves as an instrument of domination: "today, domination perpetuates itself and extends itself not only through technology, but as technology … Technological rationality thus protects rather than cancels the legitimacy of domination" (158-59).

Marcuse claims that the discourse of rationality which is established and maintained by the mass media, essentially negates all opposition. The discourse loses its play, dialogue, mediation, and consequently its ability to create new alternatives. It becomes tautologous, and in doing so it contains those aspects of the discourse that could offer an alternative to the status quo. It has, in Marcuse's words (1964), created a one-dimensional society: "there is only one dimension, and it is everywhere and in all forms" (11). Class-consciousness attained in the context of late capitalism is necessarily a false consciousness. "And this false consciousness has become embodied in the prevailing technical apparatus, which in turn reproduces it" (Marcuse 1964: 145). In the one-dimensional society, whatever "is" is right, and wrong is only

[38] His framing of technology as a veil that mystifies the domination of the Nazi machine is clearly analogous to Marx's discussion of the commodity form mystifying the exchange process (discussed in more detail below).

that which is antithetical to the whole—the one-totalizing, all-pervading, self-legitimating discourse of truth.

Feenberg seems to acknowledge such an ideology of technology. His discussion of "technological fetishism" (chapter two) is similar to Horkheimer's "technological veil" and Marcuse's "technological consciousness." Feenberg, however, is more optimistic about the prospects of overcoming such an ideology. Looking again at a concrete example from the history of technology illustrates the power of ideology in developing and maintaining large technological systems.

Evidence of Technology as Ideology in the Development of Electric Power

Electricity was at first a novelty of conspicuous consumption for the rich and was therefore not solely utilitarian (Nye 1990: 245). Streetlights and Christmas tree lights were just a few of the non-functional uses of electricity at the turn of the century. People were enthralled by the "Great White Ways" created by streetlights and advertising. The euphoria over electricity was due in large part to the grand exhibitions and fairs at the turn of the century (Nye 1990: 27). Fairs helped establish "electrification" as a correlative for the ideology of progress. In a time when smokestacks represented progress, electrification translated into civic pride (Nye, 1990: 18).

In the 1920s, electric companies focused on developing a consumer market. Executives, such as Samuel Insull, believed that electric appliances were the key to

increasing residential demand for power. Advertising campaigns were designed to sell Americans on time and labor saving appliances and on the benefits of better lighting. Advertising taped into progressive ideals that linked technological progress to a "better world for everyone" and into the already prevalent view that "things were an extension of the self" (Nye 1990: 278; 280).

Even with the heavy push from corporate advertising, residential demand remained primarily from lighting until well into the 1920s[39] (Platt 1991: 154). The situation finally began to change in the 1930s when appliance sales dramatically increased. David Nye (1990) argues that the shift in sales resulted from the context of progressive ideals and the rhetoric of corporate advertising that co-opted these ideals.[40] Technology was seen as the means of liberation for the common person (Nye 1990: 339). Corporations, such as General Electric and Westinghouse, tapped into the "technology as liberation" rhetoric with futuristic exhibits at World Fairs and Expositions. These exhibits fueled the notion that progress equates to possessing the latest consumer product (Nye 1990: 375). Technology, progress, and consumerism were packaged into an ideology in such a way that Americans believed that in buying new appliances they were helping achieve a better world.[41] Clearly, it was not simply

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[39] With the exception of the iron, eighty to eighty-five percent of residential electricity consumption was for lighting (Platt 1991: 154).

[40]Ronald C. Tobey (1996) interprets these changes differently. He claims that FDR's New Deal policy changes were largely responsible both for gaining access to electricity and for the modernization of the home.

[41] But contrary to popular belief, electricity actually served to maintain traditional family roles. Amenities tended to flow mostly toward males, as the gender lines were redrawn (Nye 1990:278). The industrialization of the home meant "more work for mother" (Cowan 1983). Liberating women from the drudgery of housework with electrical appliances simply meant that they were free to take on more

about developing and expanding the material technology. The consumer had to be "developed" along with the technologies. Ideology was therefore crucial to the expansion of these systems.

Implications for Feenberg's Theory

Acknowledging the power of ideology has significant implications for Feenberg. Although he attempts to address this in his discussion of technological fetishism, one is left with the question: can the technological hermeneutic ask questions deep enough to undermine the prevailing attitude of "technology equates to economic progress"? In short, it is difficult to understand Feenberg's optimism when he admits capitalism's "unidirectional tendency" toward "conserving hierarchical structures." The Frankfurt School's characterization of technology supported by examples from the history of technology suggest otherwise.

Emphasizing the local successes over technological design, as Feenberg does, may not only leave us far short of the goal of a more just and sustainable modernity, it may in fact blind us to a head-long plunge into an ever increasing environmental degradation. In celebrating the "democratization" of technology in these limited contexts, Feenberg largely ignores the fact that we are becoming increasingly

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responsibilities. In fact, Tobey (1996) argues that the "electrical labor-saving appliances in the 1920s culminated a century-long embourgeoisment of the home; they did not initiate an era of democratic electrical modernization" (6).

embedded in technological systems that remove us further and further from the real world in which many still face crucial life threatening environmental problems.

Nor can it be denied that much of the disparity—whether in terms of consumption, or unequal distribution of pollution burdens—is a result of the wasteful energy systems in which we are embedded. In a world where fifteen percent of the population consumes almost seventy percent of the energy, technologically induced overconsumption must be addressed (EcoWorld 2000). The increasing embeddedness in large technological systems with their associated consumptive lifeworlds contributes greatly to this disparity (Mellor 1997). This is a central reason why Feenberg's faith in environmental resistance movements is unfounded, at least with his current proposal. Any attempt to merge a critical theory of technology with environmentalism must therefore address our increasing *embeddedness* in technological systems (i.e., second nature), or conversely our increasing *disembodiedness* from the material world (i.e., first nature).[42]

Feenberg's theory of instrumentalization fails on this account. Suggesting that actors "concretize" highly differentiated technologies is worthwhile but insufficient. It is possible to successfully concretize technologies through Feenberg's secondary instrumentalization while the system, as a whole, remains disconnected or alienated from (first) nature.

[42]First and second nature are terms used to distinguish between the humanly constructed world of culture and technology and non-human nature. Granted, there is no true "first" nature left, hence we are talking about degrees.

I believe these shortcomings can be addressed in two ways. First, the connection between technology and nature necessitates a theory of human need and how that need is satisfied through the appropriation of nature. The importance of this issue will become more clear in the chapters on environmentalism, and will be addressed in more detail in the final chapter. Second, what Feenberg's politics of technology lacks is a theory of commodification (or alienation). Ironically, he acknowledges that commodification has been an emphasis of Western Marxists from Marx to Lukács to the Frankfurt School; nevertheless, he sidelines the issue in his own theory. Below I briefly discuss the origins and history of the theory of commodification, then suggest how it can fruitfully connect with Feenberg's critical theory of technology.

Critique of the Commodity Form

According to Feenberg (1981), a clear link can be made between the early Marx discussion of "commodity fetishism," Lukács idea of "reification," and the Frankfurt School's focus on technology as a "domination of rationality." However, to understand Marx's critique of the commodity form, it is first necessary to understand his conception of the human-nature relationship.

For Marx, "The whole of nature is socially mediated and, inversely, society is mediated through nature as a component of total reality" (Schmidt 1971: 79). Humans and nature are essentially one until humans begin to dominate nature for

their ends. Once humans achieve mastery, nature becomes "external" nature, or humanity's "inorganic" body (Schmidt 1971: 82). But even with the subordination of nature, humans continue to directly engage nature to produce objects of utility (i.e., use value). It is only with the shift to a capitalist mode of production that objects of production take on value in the economic sense (i.e., exchange value) (Marx 1967[1867]: 87).

According to Marx, capitalist production divides the product of labor into use value and exchange value. The use value is a product's actual utility; while the exchange value, unique to the capitalist mode of production, originates only when the product of labor is exchanged as a "commodity" (Marx 1906: 84). Under capitalism, workers encounter themselves for the first time as an "objective other" (Marx 1967[1867]: 77). The worker is estranged from the product of their labor but also from the relations that create the product. The commodity form mystifies the productive relations that go into the product and thereby hides the exploitative labor relations that produce the commodity. Marx (1967[1867]) explains how this resembles religious fetishism:

> In [the religious] world the productions of the human brain appear as independent beings endowed with life, and entering into relation both with one another and the human race. So it is in the world of commodities with the products of men's hands. This I call the Fetishism which attaches itself to the products of labour, so soon as they are produced as commodities (77).

The commodity form appears to take on a life of its own, with its own set of abstract regulating laws. For this reason, political economy uses abstract formulas, or laws, in an attempt to represent the actual material processes (Marx 1964[1932]: 106). In doing so, political economy conceals, or mystifies, the estrangement created by the capitalist mode of production (Marx 1964[1932]: 109). Marx wanted to demystify the class interests hidden in bourgeois ideology and recontextualize their voice (Gouldner 1976: 44, 51).

Georg Lukács[43] extended Marx's concept of commodity fetishism from the market to all of society (Feenberg 1981: 78). Lukács (1971) claimed that "there is no problem that does not ultimately lead back to that question and there is no solution that could not be found to the riddle of the commodity structure" (83). To this end, Lukács developed the concept of reification—the process by which relationships and people take on a more thing-like, objective quality in the commodity form. Using Weber, Lukács (1971) argued that capitalism's emphasis on specialization and calculation leads to a progressive rationalization of every aspect of society (88, 96). In reified thought the subject necessarily attempts to understand the objective world as a rational system. Indeed, once reified through the laws of capitalism, the world can only be comprehended by the internal logic of capitalism (Feenberg 1981: 102). Through the process of reification, capitalism reproduces the social forms (e.g., the

[43] The link between Marx and the critical theory of the Frankfurt School lies in the revival of Hegelian Marxism or what later became known as Western Marxism. The two most influential theorists in this regard were Karl Korsch, and Georg Lukács (Bronner 1994: 12). Together they initiated a shift away from scientific Marxism, or economism, toward a more philosophical Marxism that culminated in what is now referred to as critical theory.

state, and system of laws) that support the commodity form (Lukács 1971: 95). Lukács (1971) stressed the "totality" of the reification process achieved under capitalism: "The structure of reification progressively sinks more deeply, more fatefully and more definitely into the consciousness of man" (93).

In terms of ideas, Lukács' concept of reification was crucial to the Frankfurt School's development of the concept of "technology as instrumental rationality" (Jay 1973: 174). In essence, the Frankfurt Schoolers replaced the totalizing consciousness of the commodity form discussed by Lukács with the idea of a technological consciousness. His discussion of how the commodity form mystifies social relations is (as discussed above) later replaced by Horkheimer's concept of the "technological veil" (1982[1941]). Marcuse (1964) expands this notion with his discussion of how a pervasive "technological consciousness" serves to establish a "one-dimensional society."

Feenberg's discussion of technological fetishism is somewhat of a continuation of the Frankfurt School's discussion of technology as ideology. Hence, there exists connection between Lukács, the Frankfurt School and Feenberg in this regard. The problem, however, is that Marx's original critique of the commodity form—of commodification—has been lost along the way. Feenberg does not discuss the alienating or commodifying aspects of technology at all.[44] Although his theory of instrumentalization touches on the reifying aspect of technology, his concept of

[44] "Commodification" does not even appear in the index of his latest work *Questioning Technology* (1999).

"concretization" is inadequate. It is possible to imagine actors employing Feenberg's secondary instrumentalization (chapter two) to achieve their interests (i.e., concretize a particular technology for their ends), while the system, as a whole, remains entirely commodified.

His discussion of the Internet is a good example of this. Granted, Internet users are sometimes able to concretize their particular needs and interests from the existing system, but to what end? With regard to the environment, the case of the Internet may not appear problematic.[45] Clearly, there are technological systems, such as fossil fuel generated electric power, that explicitly damage the environment. In cases such as this we can certainly imagine actors achieving their interests (e.g., more power), while the commodified system of electric power roles on destroying the environment and human health.

Feenberg might argue that his democratic rationalization of technology could instill environmental values into these systems. But how, or to what end? His theory of instrumentalization is simply inadequate as it stands. As argued, Feenberg provides no means of addressing the commodifying aspects of technology. His focus is on actors achieving their interests within a given system. There must be a more totalizing critique of commodified, destructive technological systems.

A Theory of Technological Commodification

[45] However, one could certainly argue that the Internet is fueling the fetishized consumerism which ultimately contributes to environmental destruction.

Paul B. Thompson (forthcoming), a philosopher of technology, suggests a way of extending Feenberg's theory of instrumentalization with a theory. Thompson borrows from the field of institutional economics and the philosophy of Albert Borgmann[46] to formulate his own theory of "technological commodification." Thompson (forthcoming) acknowledges the traditional interpretation of commodification as "the transformation of something that is not bought and sold into something that is, or to the extent that something can be bought and sold in varying degrees, and increase in the degree to which it is." This is the sense in which Marx (1906) uses it when he describes how, under the capitalist mode of production, labor is transformed into something that can be bought or sold (84). Although Thompson acknowledges his debt to the Marxist tradition, he focuses on the more general definition of commodity as "something routinely bought and sold." Specifically, he wishes to emphasize the degree of interchangeability associated with commodification.

Thompson (forthcoming) details the various manifestations of commodification, claiming that it occurs in four different ways:

> 1) Alienability (the ability to separate one good from another, or from the person of a human being) is altered. 2) There is a change in excludability (the cost of preventing others from use of the good or service). 3) There is a change in rivalry, or the extent to which

[46] Borgmann's most well-known work is *Technology and the Character of Contemporary Life* (1984).

> alternate uses of goods are incompatible. 4) Goods are standardized so that there is an increase in the degree to which one sample of a given commodity is treated as equivalent to any other sample. Goods that exhibit the commodity form tend to be alienable, excludable, rival and standardized. These four parameters constitute the ideal type for the commodity form.

But in addition to these four parameters, Thompson makes the important distinction between "structural" commodification and "technological" commodification. Structural commodification involves changes in the rules, laws, or social customs associated with a particular technology. In this instance, the actual physical technology itself is not altered. Marx's discussion of wage labor is an example of structural commodification. Under capitalism labor becomes a commodity that can be bought or sold. Although "labor" itself did not change, the associated laws changed to accommodate the new capitalist mode of production.[47]

In the case of technological commodification, the technological artifact itself is altered. The four parameters of alienability, excludability, rivalry, and standardization are actually built into the technological design. Thompson offers the invention of sound recording as an example of this type of commodification. Developments in recording technology allowed music to be exchanged as a commodity. Recorded music separated, or alienated, the artist from their music, and

[47] Although technological changes to the production process obviously did occur, the first step was to organize labor under the capitalist mode of production.

the ability to mass produce recordings and sell them for profit created the conditions of excludability.[48]

Of course, transformations can involve both technological and structural commodifications. In the case of electric power for example, the actual physical technologies became more standardized overtime which resulted in a reduction in cost for the consumer. In Thompson's terminology, the "excludability" of electric power was reduced to allow more people to purchase it. But in addition there were a number of significant structural changes associated with the development of electric power. The establishment of government regulated public utilities created a structure that increased the average citizens "alienation" from electric power, as well as the utility manager's ability to "exclude."

Thompson (forthcoming) explains that "the advantages of the new vocabulary are an increased capacity to map the complexities of commodification and decommodification, and in a clearer way to express how technology and technological innovation affects those processes." He illustrates the merits of his suggested vocabulary by re-examining Feenberg's examples of AIDS activism and the Internet. With regard to environmentalism, I believe Thompson's distinction between technological and structural commodification is extremely useful, and will be applied to environmentalism below (chapter six).

[48] As Thompson notes, technology can also be used to overcome exclusion. The current (2003) struggle over downloading music from the Internet is just one such instance of this.

Conclusions

While Feenberg's suggested critical theory of technology is admittedly useful, I have in this chapter attempted to critique and build on his work. One of my central criticisms of Feenberg's theory is that he too readily discounts the rationalizing tendencies of large technological systems. These tendencies are evident in the examples of railroads and electric power, and are supported by the Frankfurt School's characterization of technology. Feenberg acknowledges this tendency in his principle of the "conservation of hierarchy," but he too quickly dismisses this characterization as "dystopian" or "essentialist." In other words, there is some truth in what Weber and the Frankfurt Schoolers argued with regard to the differentiating aspect of technology.

Nor is it enough to say that the apparent differentiation between the technological and social spheres is a result of technological fetishism. The rise of large technological systems, and their impact on society is more than "appearance." They have in fact engulfed society such that the technological has to some extent taken over. Although it is sometimes possible to thwart a deleterious technology before it becomes concretized, this is clearly the exception. In the majority of cases, citizens confront environmentally destructive technological systems that are already entrenched. For example, nuclear power was largely a victim of the activist oriented 1960s (and the media's portrayal of the Three Mile Island incident), but it also failed because the system was still in its infancy. Under different circumstances, we would

most likely be far down the road of nuclear power as in the case of many European countries. For these reasons, I want to give credence to perspectives, such as those of the original Frankfurt School, which acknowledge the differentiating and rationalizing effect of technology.

Of course, one could argue that technologies have changed from the period of the Frankfurt School's analysis, and that the new information technologies do not display these tendencies. However, there is no reason to believe that current systems inherently differ from the ones discussed. We already see the Internet moving toward standardization with the monopolization of operating systems, and the cooptation by corporate advertising. In fact, it appears that these systems are becoming entrenched even more rapidly than the ones discussed. If nothing else, such systems take us even deeper into the virtual worlds created by techno-elites.

Another problem with over emphasizing the micro-level, as Feenberg does, is the issue of direction. That is, what direction is a particular system moving? Relying on the needs and interests of participants is not sufficient. Given that human needs are constructed along with the technologies themselves, they tend to become synonymous with the needs and imperatives of the system. Therefore, human need, as well as the aims and purposes of a given technology, must be explicitly addressed. This can be accomplished through democratically agreed on norms or guiding narratives, but the point is that the technological context itself cannot be the sole

source.[49] With regard to the environment, we must recognize that many of our modern technological systems have significantly removed us from first nature. As a consequence, our needs no longer take nature into consideration.

[49] Nor can the rejection of a particular technology.

Chapter Four

Environmentalism Through the Lens of Feenberg's Critical Theory of Technology

Having outlined Feenberg's critical theory of technology, I now use this theory to examine environmentalism. However, defining environmentalism is somewhat of a problem in itself. The media and culture industry have created the idea that environmentalism is a single entity, while in fact just the opposite it true. Environmentalism is a "polyglot of groups, lacking any coherent strategy, badly fragmented, and consequently unable to muster sufficient political power to realize their goals" (Brulle 2000: 271). One way to gain an understanding of this polyglot is to look at what the various groups mean by the "environment":

> The simple label 'the environment' encompasses a huge range of political subjects requiring very different policy approaches and involving a wide variety of interest groups and institutions…The motivations behind the different issues are after all very different (Jacobs 1997: 1).

Groups lumped under the heading of environmentalism encompass a vast array of agendas, from protecting wilderness from logging to protecting children from lead paint.

Despite this variance there does appear to be at least four distinct strands of environmentalism: wilderness preservationism, radical environmentalism, mainstream (reform) environmentalism, and grassroots environmental justice (EJ).[50] Preservationists and reform environmentalists are considered more "mainstream" and receive the most attention in terms of their agendas and numbers of constituents. However, radical environmentalists are receiving increased attention with the emergence of eco-terrorist groups such as Earth First! and Environmental Liberation Front (ELF). Radicalism is in short a reaction to the perceived failures of preservation-minded environmentalists. EJ, on the other hand, can be read as a response to the failure of reform environmentalists.

Looking at the origin and progression of the different strands of environmentalism offers insights into their radically different aims and approaches. More importantly for the project at hand, this analysis reveals which strand best resonates with Feenberg's critical theory of technology. From his critical theory perspective, there are two important distinctions that emerge. One is whether the

[50] There are many ways of parsing environmentalism, but the literature seems to agree with at least these four main divisions. I will define each as I discuss them individually below.

focus is the *built environment* or *non-human nature*.[51] In addition, environmentalists can be divided according to their preferred action strategy, that is, *direct action* versus *legislative*.[52] The majority of the large national organizations, based primarily in Washington, D. C., focus on lobbying and legislating and when necessary taking legal action. In contrast, there are literally thousands of small single-issue grassroots groups using direct action to protect forests, as well as their families.

My analysis therefore attempts to parse out groups according to their focus (i.e., built environment versus non-human nature) and their primary strategy (i.e., direct action versus legislative). Choosing to focus on these distinctions is by no means arbitrary; there are many ways to analyze environmentalism. However, as will become clear, the "focus" and "strategy" of environmentalists relate directly to Feenberg's critical theory of technology. Nor is this analysis comprehensive; it is rather intended to illustrate how Feenberg's critical theory of technology can be used to assess various environmentalisms. Like Feenberg's, my approach is both normative and descriptive; that is, my "analysis" is at the same time a "critique" of the different environmentalisms. The overarching theme is that the various environmentalisms represent different ways of dealing with the problem of "differentiation," as discussed in chapter two.

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[51] I do not concede this dichotomy; there is no unmediated nature left. However, for the sake of explication I use the distinction which too many accept.

[52] By "legislative" I also mean the corollary aspects of regulation and enforcement.

Wilderness Preservationism

The history of wilderness preservation is closely tied to the conservation movement. George Perkins Marsh's *Man and Nature* (1965 [1864]) is considered one of the first enunciations of American conservationism (Shabecoff 1993: 65). Using many examples, Marsh argues that civilization subdued nature to its own detriment (Nash 1967: 104). By the mid-nineteenth century, excessive erosion, worn out farms, deforestation, and species extinction gave clear evidence of the excesses imposed on nature by civilization. The United States was no longer the land of plenty—a land flowing with milk and honey—with unlimited resources free for the taking. Acknowledging limits led, in turn, to efforts to conserve the remaining resources.

Conservation, as the efficient use of resources for a sustained yield, was first applied to forests. Gifford Pinchot learned techniques for the scientific management of forestry in Europe. On returning to America in the 1890s, Pinchot applied his knowledge to the management of George W. Vanderbuilt's "Biltmore Estate" in North Carolina (Shabecoff 1993: 66). Pinchot proved that with proper management (i.e., conservation) principles, forests could be sustainably harvested and also more productive (Miller 2001).

In 1905, President Theodore Roosevelt appointed Pinchot head of the recently established U.S. Forest Service (Nash 1967: 139). Pinchot had a ready listener in Roosevelt, a self-proclaimed outdoorsman, and together they passed a number of

foundational forest management acts (Rothman 2000: 25). They used progressive conservationist ideals to dramatically change the way public lands were managed. Robert Brulle (2000) explains:

> This version of conservation emphasized the wise technical administration of natural resources for the enhancement of material life and the support of distributive justice. At its core, Progressive conservation was an attempt to manage natural resources to provide the material conditions for a liberal democracy (152).

Progressivism emphasized government intervention to curtail laissez-faire capitalism, and was the driving ideal in post-Civil War United States from 1865 until the 1890s (Rothman 2000: 16-17). Conservation ideals, on the other hand, stem from the Utilitarian concept of the "greatest good for the greatest numbers" (Mill 1998 [1861]), and emphasize the needs of the community as a whole over the needs of the individual.[53]

During this same period a wilderness preservation movement ran parallel to the conservationist movement. Its origins, however, are entirely distinct. Preservationism is rooted in nineteenth-century landscape artists and romantic writers, who emphasized nature as a source of aesthetic and spiritual enjoyment.

[53] In this day where cost-benefit analysis is used to justify practically anything, it may seem difficult to believe that the founders of Utilitarianism, Jeremy Bentham (1948 [1789]) and John S. Mill (1998 [1861]), did in fact intend their theory as a reply to unrestrained capitalism.

Preservationists pushed to set aside the few remaining wilderness sites, as they saw them quickly disappearing. Naturally, the places that were "appreciated" were the ones ultimately protected from destruction (Hargrove 1989). Like conservationism, preservationism is in some sense rooted in the realization of limits. Artists and writers constructed nature as an aesthetic "resource" that was rapidly diminishing and therefore needed protection.[54]

Until the early twentieth century, preservationists and conservationist worked together. John Muir, founder of the Sierra Club, was one of the chief proponents of setting aside wilderness areas, such as Yosemite Valley, as national parks. Originally, Muir worked closely with Roosevelt and Pinchot to protect the environment. However, when the question of what to do with the newly established forest reserves arose, the incompatibility of conservation and preservation became clear. Muir believed the forests should be set aside, while Pinchot thought they should be managed for the benefit of civilization as a whole (Nash 1967: 136-137).

The Hetch Hetchy dam controversy (1908-1913) put a permanent wedge between the two. The impetus for the dam grew out of San Francisco's burgeoning water needs. The Hetch Hetchy valley, located in Yosemite National Park, was suggested as a possible reservoir site. In addition to the fact that Hetch Hetchy was located within a National Park, it also contained one of the last remaining stands of Redwoods. As such, it was considered sacred to preservationist-minded individuals,

[54] To be enjoyed by those that could afford to do so.

such as Muir. Roosevelt and Pinchot, however, approached the issue from a conservationist perspective and put the needs of the community over Muir's sacred valley. The dam was constructed (Nash 1967: 164). The split between preservationist-minded wilderness advocates and resource-minded conservationists was permanent.

Hetch Hetchy, a disheartening loss, was also the beginning of a distinct preservationist movement. Although the 1920s and 1930s were dominated by a conservation ethos (Rothman 2000: 60), preservationists were not idle. The Wilderness Society, for example, was started in 1935 by wilderness advocates Bob Marshall, Aldo Leopold, and others (Brulle 2000: 169). Today, preservationist-oriented organizations are the most powerful in terms of members and annual income (Brulle 2000: 243, 244)

Despite their power and popularity, there is little chance of wilderness advocates connecting with Feenberg's critical theory of technology. Their focus on non-human nature and legislative approach to reform precludes such a marriage. Technology is not engaged but ignored, almost entirely. One could argue that, at least in the short term, their success has little to do with the built environment and technology. That is, preservationists can fence off so-called "pristine" wilderness, while the lived environment continues on its destructive path.

There is also a problem of split allegiance among wilderness advocates, that is, between constituents and the corporations that provide funding. With corporations sitting on their boards and providing a large part of their funding, it is not difficult to see the problem. Regardless of their source of income, the bifurcation among wilderness advocates runs far deeper than between their stated goals of protecting nature and appeasing corporate partners. The constituents themselves embody contradictions. Upper-middle class members of organizations such as Sierra Club, Wilderness Society, and Nature Conservancy write their annual checks, but fail to address the way they live in the built environment (Luke 1997)

Radical Environmentalism[55]

While many preservationists believed that compromise was the only way to achieve their goals, there were a few stalwarts such as David Brower, a long-time president of the Sierra Club. For Brower and a small group of environmentalists, this compromise was unacceptable. From the late 1950s, the Sierra Club and other environmental organizations fought vigorously to prevent dams from being built in pristine wilderness areas. Eventually, however, the wilderness supporters compromised. In exchange for promises not to build proposed dams in the Dinosaur

[55] I am focusing primarily on the praxis of a particular strand of radical environmentalists. There are many other so-called "radical" schools of thought, such as social ecology, and the various eco-feminisms. However, it is difficult to connect any of these theories to particular movements within environmentalism.

National Monument, environmentalists agreed to allow one to be built in Glen Canyon just north of the Grand Canyon (Harvey 1994). Christopher Manes (1990) explains how the dam:

> represented what was fundamentally wrong with the country's conservation policies: arrogant government officials motivated by a quasi-religious zeal to industrialize the natural world, and a diffident bureaucratic leadership in the mainstream environmental organizations that more or less willingly collaborated in this process…[The dam] remains an important event in the iconography of the radical environmental movement, dramatizing what a growing number of activists believed: that our technological culture with its intrusions on the natural world had to be curtailed, perhaps even undone, to keep the ecology of this planet and our role in it viable (5, 7-8).

In much the same way that the Hetch Hetchy dam controversy had earlier divided conservationists and preservationists, the Glen Canyon dam divided modern wilderness advocates. Those fed up with the current course went their own way; the result was the birth of "radical" environmentalism.

Following Brower's dismissal from the Sierra Club in 1969 (largely for his unwillingness to compromise), he formed his own organization—Friends of the Earth—to take a more aggressive stance in defending wilderness (Shabecoff 1993:

101). Brower's organization, along with later groups such as Earth First!, Greenpeace, and the Sea Shepherds, launched a straight-ahead, no-compromise attack on any and all who they deemed responsible for destroying nature.

With some success, these groups have used every means possible, including putting their own bodies in danger, to stop new wilderness roads, protect endangered species, and prevent the logging of old growth forests. Although most environmentalists consider these acts extreme, it is the practice of "ecotage" that has garnered so much attention. While there is an immense degree of ideological diversity among radicals, the practice of ecotage appears to be the one commonality (Manes 1990: 16). Ecotage, or ecological sabotage, was inspired by Edward Abbey's *The Monkey Wrench Gang* (1975). Abbey tells the story of a small group of environmentalists who decide to commit acts of sabotage to stop environmental destruction. Ecotage includes acts such as: spiking trees, destroying heavy machinery, toppling power lines, and ramming whaling boats. By 1990, Manes estimates that as many as twenty to twenty-five million dollars were being lost every year to these activities (9). With extremely narrow profit margins in natural resource industries, any losses can be significant. For example, the loss of a $100,000 bulldozer to the "creative mechanics" of a few environmentalists could jeopardize a small logging project. Actions such as tree spiking, however, are potentially much more costly and dangerous.

Driving steel spikes into trees, while it does not damage the trees themselves, makes them almost impossible to harvest. The spikes, if undetected, can cause considerable damage to the equipment, as well as the operators. Although there have been few injuries related to spiking (primarily because the saboteurs freely disclose areas that have been spiked), injuries, nevertheless, can and do occur. Radicals claim that their intentions are not to injure humans but many of them are not terribly apologetic either. Dave Foreman, for example, has openly proclaimed to be at war with those responsible for destroying the earth, and that as in any war casualties can be expected (Zakin 1993).[56]

Taking or even endangering human life to save nature is obviously wrong, but there is another issue—is the practice of ecotage even effective in reducing or eliminating environmental destruction? If not, then risking human life cannot be justified even by the radical's own ideology. Ecotage activities have undoubtedly brought attention to the needless destruction of the environment, enlightening and inspiring others to take further action (Scarce 1990: 260). These actions, however, are frequently exploited by anti-environmentalists to create a backlash. In the process, environmentalism as a whole is denigrated. If the goal of the radicals is

[56] Foreman, however, was forced to recant these statements after prosecution (Zakin 1993).

genuinely to protect nature at any cost, then they would refrain from actions that jeopardize the movement.[57]

The problem, however, is that many radicals believe that a retreat from extremism (i.e., ecotage) leads to compromise. Given that the justification for initiating a distinct movement was largely because of the compromising stance of mainstream environmentalists, relaxing their agenda is simply not an option for most radicals. On the other hand, radicals make the agendas of more moderate environmental organizations such as the Sierra Club seem more palatable. Although mainstream environmental groups do not explicitly sanction the actions of their more radical cousins, they nevertheless admit that they benefit from them (Manes 1990: 18, 19). Radicals bring awareness of environmental issues, and thereby fill the coffers and membership lists of mainstream organizations. Hence, there are pros and cons to the controversial actions of radicals for environmentalism as a whole.

Although radical environmentalists may provide a useful catalyst to the movement, they will remain a "fringe" element because of their ideological commitments. Their ideology prevents them from connecting with broader social movements—a connection that must be made to transform the destructive tendencies of the present culture into something more sustainable (Brulle 2000: 205-206). In

[57] This obviously assumes that the environmental movement as a whole is somewhat successful which the radicals do not.

terms of their ideology, one of their central tenets is the belief in the inherent value of all life/nature (i.e., bio/ecocentricism).

Drawing largely on Deep Ecology,[58] radicals argue for an extreme egalitarianism that places humans on the same level with all other species[59] (List 1993: 6). While in theory this may sound legitimate, carried to its logical conclusion it becomes deeply problematic. For example, Dave Foreman claimed that AIDS is actually beneficial, because it reduces the human population (Manes 1990: 233). Clearly, most people would argue that condoning the AIDS epidemic to save nature is absurd, but this is in fact the logical outworking of ecocentricism. Hence, it is not difficult to see that the radical's ecocentric perspective is at odds with the goals of other, more anthropocentric, social movements (as well as critical theory). In fact, some radicals have openly rejected any affiliation with broader social and political movements (List 1993: 6). Their failure to offer a realistic agenda for broader social transformation is undoubtedly the greatest shortcoming of radical environmentalists. Although the wholesale dismissal of modern society may not be entirely misguided, it will take more than a few radicals spiking trees to raze the ground on which the present environmentally destructive edifice is built.

The radicals' anti-technology stance is also problematic for the project at hand. For the most part, radicals are Luddites; the less technology and development

[58] See the works of Arne Naess and George Sessions.
[59] I am speaking here of high profile groups such as Earth First! There are a plethora of fringe groups that draw their inspiration from ecofeminism, social ecology, and many other sources.

the better (Scarce 1990: 12). Radicals therefore want to solve the problem of differentiation, as discussed in chapter two, by eliminating (de-differentiating) technological progress altogether. Granted, reducing the human population to a few million hunter-gatherers would probably be better for the earth as a whole, but the likelihood of achieving this goal is minimal. Any path to a more just and sustainable society must necessarily begin with a theory of how to transform the lived environment—the built environment and the technological infrastructure supporting it. We, therefore, need an environmentalism that can fruitfully engage technology, or "concretize" technology to use Feenberg's term, not destroy it entirely.

Modern Reform Environmentalism

The roots of modern reform environmentalism lie in the postwar period. Samuel Hays (1987) argues that the ideology of modern environmentalism was established in the American mind through the post-war quest for a "better life." Whereas many environmental historians have argued for continuity between the earlier conservation-preservation movement and modern environmentalism, Hays claims that the transition from conservationism to modern environmentalism was categorically different.

Whereas conservationism was concerned with production (i.e., with the efficient use or production of resources), modern environmentalism focuses on consumption (Hays 1987: 13).[60] The post-war push for an improved quality of life seeped into American's relationship with nature and fostered an aesthetic appreciation. This fact, in conjunction with a dramatic increase in mobility (i.e., affordable automobiles and an interstate system) enabled many Americans to partake of the "great outdoors."[61] Nature was commodified as a source of leisure for Americans. Oddly, as the appreciation of nature was mounting, so was the destruction. The same post-war development boom that enabled Americans to set aside nature for their aesthetic appreciation, also contributed to its demise.

There was a dark side to the postwar "progress." Hailed as the universal answer to humanity's ills, the development of the petro-chemical industry following WWII was in reality a mixed blessing. Synthetic fertilizers and pesticides drastically increased agricultural production, and produced a constant flow of cheap goods to consumers; but at the same time, unseen toxics (e.g., DDT) were creating visible damage to humans and the environment. A paradox existed: Americans enjoyed and desired the "good life" created by technological advancements but at the same time

[60] Hay's (1987) claim that modern environmentalism arose from the post-war affluence seems plausible; people are only concerned about the environment if they can afford to be. However, Hays distinction between conservation and modern environmentalism is less clear; production and consumption are inextricably linked. It should also be noted that EJ is focused primarily on (by)production. The real issue is a failure to make a connection between production and consumption.
[61] See Paul Sutter, *Driven Wild* (2002) for a discussion of the role of the automobile in wilderness conservation.

they disliked the deleterious effects of technology. Modern reform environmentalism emerged from this paradox.

When modern environmentalism actually began is a subject of debate; and while it is impossible to pinpoint the beginning of such a large heterogeneous movement, its origins no doubt lie somewhere between 1960 and 1970. Clearly identifiable as a popular movement by the first Earth Day in 1970, the establishment of the United States Environmental Protection Agency (EPA), also in 1970, solidified the "environment" as a national cause. The publication of Rachel Carson's *Silent Spring* (1962) is frequently mentioned as the beginning of modern environmentalism (Sale 1993: 6; Shabecoff 1993: 107); however, to say that Carson's book was solely responsible would be an overstatement. Many of the ideas in her book had been growing in post-war America during the 1950s, otherwise *Silent Spring* would not have resonated so acutely with the American public. After *Silent Spring*, there were a host of books[62] that struck a nerve with the general public's growing distrust of big government, technology, and the military-industrial complex (Winner 1977: 6). Most significantly, these authors helped to redefine the environment as a threat to humans rather than as something to be enjoyed. In essence, they made explicit the connections between technology and technocratic domination that critical theorists had long proclaimed.

[62] See Bookchin 1962; Goodman 1962; Ellul 1964; Marcuse 1964; Commoner 1966, 1971; Schumacher 1973.

Obviously pollution was not new; it had been an accepted price for the benefits of progress since the beginning of the industrial revolution. However, the extent of the threat increased dramatically with the advent of the petrochemical industry and nuclear power. Thus the primary difference was the scope of the problem; but another important difference was the fact that even relatively affluent Americans were affected. Where wealth previously enabled a minority of Americans to separate themselves from the excesses of progress, this was no longer the case.

Reform Environmentalism: Success, or failure?

Although it is true that legislation to protect the environment passed prior to 1970, enforcement remained sporadic at best. Moreover, most of these laws focused on protecting human health rather than the environment itself. It was not uncommon for industrial wastes, and in many places raw sewage to be discharged directly into waterways; or for solid waste, hazardous or not, to be incinerated, land filled, or simply dumped without regard for the environment (Tarr 1996). It is not surprising, therefore, that after years of neglect any amount of effort would see results.

However, more than thirty years after the first Earth Day (1970), we remain far from establishing a sustainable society. The passing of the first major federal environmental legislation (1969) and the establishment of the U.S. EPA (1970)

marked the beginning of a concerted national effort to reverse environmental degradation. Since then over one hundred major legislative acts have been passed, and over $150 billion are spent annually cleaning up or protecting the environment (Shabecoff 2000: 9, 90). To what avail? Robert Brulle (2000) sums it up well: "Virtually all the projected trends point toward significant and irreversible problems due to ecological degradation. These projections must be taken seriously if we are to formulate actions to mitigate their consequences" (4).

The most significant improvements occurred in water quality, but even here over forty percent of U.S. waterways are not fit for drinking or recreational usage (Brulle 2000: 1). Stopping the direct discharge of waste into lakes and rivers obviously helped, but the primary source of water pollution comes from non-point sources (e.g., agriculture run-off), which are still not effectively regulated. Air and land have faired even less well; this is at least partially a result of shifting the pollution from a highly visible media (i.e., water) to a less visible media (i.e., air, or soil) (Tarr 1996).

Although the issue of global warming is highly contested, the other effects from fossil fuel use less so.[63] Acid rain, smog, and dramatic increases in respiratory related illnesses testify to the deleterious effects of fossil fuel usage. As a

[63] Of course, all of this can be questioned with regard to the interpretation of scientific data. See for example the spins by Lomborg (2001), or Easterbrook (1995). However, the controversy over the interpretation of scientific data only adds credence to the grassroots emphasis on experiential data, which will be discussed in the following chapter.

consequence of fossil fuel burning, atmospheric carbon dioxide levels have steadily increased since the mid-nineteenth century (Flavin 1999: 59). Largely as a consequence of fossil fuel, 129 metropolitan areas, home to over 107 million Americans, do not meet air quality standards (O'Meara 1999: 128).

As of 1990, U.S. industries were still releasing approximately twenty billion pounds of toxic chemicals into the environment every year (Commoner 1990: 31); the fact that these chemicals are not clearly visible does not make them any less harmful. In addition, endocrine disrupting hormones from environmental pollutants, such as plastics manufacturing and waste incineration, have been linked to decreasing sperm counts. Since 1938, counts have declined fifty percent, and testicular cancer has increased two to four fold (Halweil 1999: 148-9).

These are just a few of the ongoing environmental problems but there are many others: development issues such as urban sprawl, acceptable "use" of federal lands, large dam projects, habitat loss and the list goes on. In addition to these "old" problems, many new threats to the environment and human health arise daily through technological developments. A host of new chemicals offer unknown dangers once released into the environment, or when the issue of disposal is confronted. Over seventy thousand new chemicals are created every year, while only a fraction of these are tested for their effects (Shabecoff 2000: 149). Even the testing that is done, such as the LD-50 (i.e., the lethal dose required to kill fifty percent of the test subjects), cannot determine the chronic or synergistic effects on all biotic forms. Genetically

modified food (GMF) is another example. Some humans ingesting GM corn have reported severe allergic reactions (Kaufman 2000), and the pollen of the altered corn plant has been implicated in a massive die-off of butterflies (Yoon 2000). The ripple effects of apparently "inconsequential" changes in the environment cannot be ignored as harmless.

The state of the global environment as a whole must also be considered. The United States, contrary to the beliefs of many, is not an island.[64] Progress toward cleaning up and protecting the environment in the United States must not be achieved at the expense of other countries. Clearly, the U.S. cannot resolve its environmental woes by exporting pollution, but this is exactly what has taken place through "free trade" agreements, such as NAFTA and GATT (WTO's precursor) (Shabecoff 2000: 163). Industries unable, or unwilling, to meet United States environmental standards have simply packed up and moved "south of the border" or wherever else the standards are less stringent. Not only is this approach unethical (i.e., dumping it on those that do not have the power to resist), it is clearly not prudent. Since ecological systems are inter-dependent, we are ultimately hurting ourselves.[65]

In sum, although there have been limited successes, we remain far from a sustainable society. The reasons for this failure concern the strategy of mainstream

[64] The current (2003) administration's stance on issues such as climate change and GMF could lead one to believe otherwise.
[65] If inclined to believe the evidence, global warming, the hole in the ozone, and depleted fish populations are indicative of this interdependence.

environmentalism. Any progress, in terms of legislation and cleaning up the environment, achieved during the 1970s was all but wiped out when Ronald Reagan entered office in 1980. The EPA was turned over to pro-industry conservatives; proposed legislation was sidelined; and an anti-environmental backlash emerged (i.e., the Wise Use movement) (Shabecoff 1993). In this hostile context, environmentalists were forced to use different tactics. Prior to this, mainstream environmentalists primarily utilized litigation and legislation to achieve their goals. Organizations such as the Sierra Club and the Natural Resources Defense Council, had in some measure, reached their objectives by lobbying for new laws or when necessary taking legal action. The shortcomings of this approach became evident with the change in administration.

Many of the laws were full of loopholes, but a greater problem concerned enforcement. While the laws may remain, the amount of enforcement tends to vary considerably depending on the degree of commitment on the part of the current administration. Moreover, corporations and environmental organizations both realized the shortcomings in attempting to achieve compliance through legal action. Environmental organizations lacked the funds to fight corporations in court and the corporations did not want the publicity. Compromise (or capitulation) through negotiation was the end result (Dowie 1995).

Although hailed as a significant breakthrough for addressing environmental problems, negotiation and compromise have been criticized on a number of grounds.

For one, many corporations bought their way onto the boards of mainstream organizations by making generous donations in exchange for a seat (Gottlieb 1993: 159). Obviously, an industry representative cannot be expected to remain unbiased in this position. Secondly, the bottom line for industries has not changed—their goal is still to maintain or increase profits. That said, it is clear that the only reason industry appears to play along with the "negotiation" game is because it is to their advantage. And this is true, corporations benefit from this tactic; compromise is less expensive and generally less work.

From the environmentalist's point of view, the negotiation process entails an endless system of tradeoffs. Pollution is simply shifted around, while the root problems of production and consumption continue. In short, mainstream environmentalism is invested in the same system that supports and is supported by the polluters, as such it is largely ineffective. In terms of Feenberg's theory of instrumentalization, mainstream environmentalists appear content with the current degree of "differentiation." Significantly, all of the major environmental problems discussed above can be linked to large (differentiated) technological systems. Reform environmentalism has for the most part failed to effectively address these technologies.

Environmental Justice

The roots of EJ extend as far back as the conservation-preservation debate, and lie in the struggle of working class, minorities, and women to improve their basic living and working conditions. Robert Gottlieb (1993) argues that this history has been largely ignored and criticizes environmental historians for their exclusive focus on mainstream environmentalism (i.e., conservation and preservation). Gottlieb (1983) claims that these histories tell only the story from the perspective of white, upper-class Americans, and tend to center around debates over whether or not to develop wilderness into playgrounds for the wealthy—a decision far removed from the average American (6-7).

There is another perspective, that is, of how working class people have struggled to improve their working and living conditions. From the late nineteenth century on, various groups have organized on a site/issue specific basis to improve their conditions. Significantly, these movements have been organized and run primarily by women. One well-known example is the Chicago-based Hull House settlement established by Jane Addams in 1888. Gottlieb (1993) explains how Hull became:

> both the meeting ground and a key symbol of the movements for change contesting the urban and industrial order of the period. Focused on the conditions of daily life in their neighborhoods, the settlements immediately confronted questions of housing, sanitation, and public health (60).

Environmental health issues were a central concern, and Addams succeeded in making dramatic improvements in garbage disposal practices in the surrounding tenements. Alice Hamilton, a trained medical doctor, is another person associated with Hull House. Hamilton investigated the industries where many of the residents worked, and suggested less-harmful substitutes for the toxic substances used in industrial processes (e.g., lead and phosphorus) (Gottlieb 1993: 49).

Although workplace health and safety has remained a significant concern for workers and unions, the degree of success achieved in this area is clearly tied to wage and job security. Worker leverage evaporated during the depression and was eclipsed by the Second World War. Not until the prosperous post-war period were workers able to establish an organized resistance for better working conditions. There has, however, remained a tension between environmental concerns and job security.[66]

On a broader scale, a number of authors in the 1960s and 1970s opened the eyes of Americans to the toxic threat created by unrestrained military and industrial growth (see n. 13 above). The hidden dangers that many Americans had experienced for years were suddenly receiving national attention. The difference was who, specifically, was being affected. That is, people were becoming involved in environmental issues based on who they were and where they lived and worked (Gottleib 1993: 208). This is the basis for the EJ movement that became explicit in

[66] For an excellent case study, see Andrew Hurley's (1995) *Environmental Inequalities: Class, Race, and Industrial Pollution in Gary, Indiana 1945--1990.*

the 1970s. The EJ movement is composed primarily of groups that traditionally have been exploited—the poor, minorities, and women.[67] The fact that these groups receive more than their share of pollution is not a coincidence, and this is what makes their cause an issue of justice.

Incidents such as Love Canal (1978) and Three Mile Island (1979)[68] in the 1970s made the dangers discussed by Rachel Carson (1962) and others a reality. Citizens were forced to organize to save their homes and families. Obviously, this in itself was not new; certain groups had long suffered under the hand of big business and government. But in the context of the 1960s, with the rise of the civil rights movement and the New Left, exploitation in all its forms was coming under scrutiny (Gottlieb 1993: 318). Love Canal and similar incidents expanded the movement to such an extent that it could no longer be ignored.[69]

Events in the early 1990s forced mainstream environmentalism to take notice of the EJ movement. First, in 1990 a number of civil rights and EJ leaders wrote a letter to the most prominent national environmental organizations, claiming that the environmental movement was largely "nonrepresentative and fundamentally racist" (Brulle 2000: 217). They demanded that the organizations hire more minorities and

[67] In this sense, EJ is to some extent based on standpoint theory, which has its origins in Marx.
[68] The Three Mile Island incident involved a partial meltdown of the reactor at a nuclear power plant near Harrisburg, Pa. The Love Canal incident will be discussed in detail in chapter five.
[69] Of course it didn't hurt that the residents of Love Canal were mostly white and middle-class.

include more minority related issues. The motivation for the shift finally occurred in 1991 when "the People of Color Environmental Leadership Summit" was held in Washington, D.C. Gottlieb (1993) explains that the purpose of the Summit "was to begin to define a new environmental politics from a multi-racial and social justice perspective…[and] to redefine the central issues of environmental politics, not just to join a coalition of special interest groups" (3, 4). What was essentially at stake in both of these incidents was the definition of environmentalism and of the environment itself. Minority leaders wanted support, but also the autonomy to address issues in the way they felt best suited the needs of their constituents. The fundamental difference centered on the fact that EJ is concerned with where people live and who they are, instead of non-human nature.

As a result of these two incidents, organizations such as the Sierra Club placed minorities on their boards and attempted to incorporate EJ issues into their agendas. However, the results have been unsatisfactory to many of the people involved in EJ movements. One complaint is that the large national organizations are taking away desperately needed funding and that they frequently co-opt local projects. What the locals want and need is funding, not lip service or a token spot on a board (Allen 2001).

Mark Dowie (1995), however, claims that grassroots EJ can infuse mainstream environmentalism with passion to create a "fourth wave"[70] environmentalism. Mainstream environmental organizations are in fact taking notice of grassroots EJ issues.[71] I am skeptical, however, that the infusion of grassroots environmentalism, as Dowie advocates, will alleviate the problem of entrenched bureaucracy and professionalism in mainstream environmentalism. Most likely, the fervor will be co-opted by the same old rhetoric which is what appears to be happening as national organizations join the EJ chant.

Conclusions

Feenberg's critical theory of technology provides both a means of analyzing the various environmentalisms and a normative critique thereof. Clearly, in that his theory is concerned with transforming technology, it is fundamentally concerned with the "built environment." This is not to say that non-human nature is irrelevant, but that the built environment is the starting point for transformation. As the built environment is transformed, our relationship with non-human nature changes as well. However, the impetus for change must be citizens' engagements with technology. When people confront an environment that is not conducive to their conception of the

[70]Kirkpatrick Sale (1993) suggests that there have been three waves of environmentalism up to this point.
[71] The U.S.E.P.A. has also added an Office of Environmental Justice to address these issues.

"good life," they desire to change it. Hence, an environmentalism motivated by a critical theory of technology would at least start with a "direct action" strategy to change the "built environment."

Given preservationists' focus on non-human nature and their legislative approach, there is little possibility of connecting with Feenberg's critical theory of technology. The radical end of the spectrum definitely offers a more pungent critique of the system, is obviously not short on action, and is willing to engage technology (i.e., destroy it). The problem, however, is that they are too narrowly focused on protecting non-human nature. There is virtually no possibility of connecting their ecocentric ideology to Feenberg's anthropocentrically oriented critical theory. Ranting about the rights of nature is ludicrous when much of the world lacks the basic necessities of life. Moreover, radicals are for the most part Luddites, attempting to reverse the technological progress (and population) of modernity. In Feenberg's terms they are attempting to "de-differentiate" modernity. This is not to say that their actions are pointless, only that they will remain a fringe element at best.

To their credit, modern reform environmentalism focuses on transforming the built environment to create more sustainable and healthy living conditions. As well intentioned as they may be, reform environmentalists have largely failed to achieve their goals. The problem is their legislative approach that relies heavily on technocrats and politicians. They are in Feenberg's terms using primary instrumentalization to maintain or increase differentiation between the technological

and social spheres. Reflecting on the various environmentalisms in terms of the strategy, focus, and approach to the problem of differentiation we can derive the following matrix:[72]

	STATEGY	**FOCUS**	**DIFFERENTIATION**
Feenberg's CT of Tech	*Direct Action*	*Built environment*	*Decrease*
Wilderness Preservation	Legislative	Non-human nature	Ignores
Radicals	Direct action	Non-human nature	De-differentiate
Modern Reform	Legislative	Built environment	Maintain/Increase
Environmental Justice	Direct action	Built environment	Decrease

Chart 2: Breakdown of environmentalism by strategy and focus

Of the environmentalisms discussed, grassroots EJ is clearly the most representative of Feenberg's critical theory of technology. This is particularly evident in how activists directly engage technologies to bring about less-differentiated, more concretized systems. They are, in Feenberg's terms, attempting to reconcile primary and secondary instrumentalizations of the built environs. EJ therefore represents the best instantiation of his suggested critical theory of technology.

While the EJ movement as a whole has met with mixed success, those that have networked together to fight a common cause have been more successful. As in

[72] This is obviously a gross over-simplification. These are, however, the most important distinctions in terms of the current project. For a more complete breakdown, see Brulle (2000).

the case of environmentalism, EJ is also an extremely diverse movement. The toxics movement that emerged from the Love Canal incident is one such example. What began as a Not-in-My-back-Yard (NIMBY) movement, was transformed into a Not-in-Anyone's-Back-Yard (NIAMBY), and finally into a united front. The next chapter will detail the tactics employed by this successful movement.

Chapter Five

The Toxics Movement as an Instantiation of Feenberg's Critical Theory of Technology

> "In siting, what is rational for the many is irrational for the few. Siting thus becomes a modern ceremony for selecting victims for sacrifice" (Edelstein 1988: 195).

I have thus far outlined a modified version of Feenberg's critical theory of technology and delineated grassroots environmental justice (EJ) as the strand that resonates most with his theory. However, grassroots EJ like environmentalism itself is not a homogenous movement; rather, it is the name given to the hundreds of diverse groups involved in struggles to protect the places that people live, work, and play. Hence, it is not possible to simply suggest a link between Feenberg's critical theory of technology and "EJ." A case study provides an illustration of how the ideologies and strategies of one movement could actually mesh with Feenberg's theory. In short, I am offering a case study as an instantiation of this theory, just as Feenberg has done with case studies of the Internet and AIDS activism.

To this end I have chosen to examine the toxics movement, the success of which is undeniable. The movement took off at a time (early 1980s) when the majority of mainstream environmental groups were beginning to languish. The accomplishments of the toxics movement are evident in that the total amount of toxic chemical releases decreased forty-eight percent from 1988 to 2000 (U.S.EPA 2002: 12). In addition, from 1988 to 1995 the release and transfer of seventeen targeted chemicals dropped nearly sixty percent (U.S.EPA 1999: 6). These statistics coincide with the efforts of grassroots activists, which have resulted in the closure of hundreds of hazardous waste landfills and prevented the opening of many new ones.

A significant point, however, is that while on-site releases decreased fifty-seven percent, off-site releases increased seven percent (U.S.EPA 2002: 12). This shift is a result of waste increasingly being shipped off-site for treatment. In 1979, over ninety percent of waste was treated on-site (Colten and Skinner 1996: 94), while today the majority of waste is now transferred off-site. A large number of these on-site waste depositories have become Superfund sites as industries failed or relocated. What this means is that industries are now doing a better job of storing, handling, and processing toxic chemicals on-site, but that overall toxics are being transferred off-site in the form of "hazardous waste." As a result, there is increasingly the issue of where to locate these offsite waste disposal facilities. Inevitably some group—most likely a poor minority community—is negatively affected by these disposal practices.

I begin the case study by explaining the origin and history of the Love Canal incident—the event that triggered the birth of the toxics movement. This enables the

reader to see how movements such as this begin through the specific life experiences of individual citizens. This background is also important for understanding that certain individuals, corporations, and institutions were in fact responsible for what happened. In addition, it illustrates the tensions between technocratic power (primary instrumentalization) and the concrete lives of citizens (secondary instrumentalization). Next, I discuss the establishment of the full-blown toxics movement, and in particular the emergence of Lois Gibb's organization—The Center for Health, Environment, and Justice (CHEJ). Finally, I discuss CHEJ's background theory and the strategies it has used so successfully. Along the way, I will make explicit the connections with Feenberg's critical theory of technology.

Love Canal

The origins of the Love Canal incident go all the way back to the late nineteenth century. William T. Love attempted to construct a power-providing canal by harnessing water from the Niagara River. Work on the canal did not get far before the development of central station power (early 1890s), and the depression of the 1890s put an abrupt end to the project. A hole one mile long, forty-five feet wide, and ten to forty feet deep was left behind (Brown 1979: 8).

The abandoned canal became a municipal and chemical disposal site in 1920 (Gibbs 1998: 21). This was perfectly legal because there were no specific laws dealing with hazardous waste disposal at the time (Colten and Skinner 1996). Hooker

Chemical Company, a subsidiary of Occidental Petroleum Corporation, began dumping at the site in 1942 and purchased it in 1947. Hooker, alone, estimates that it dumped more then 21,000 tons of various chemicals in the canal[73] (Levine 1982: 10). With the canal full in 1952, Hooker sought a way to relieve itself of the liability; hence, when the Niagara Falls School Board (NFSB) offered to purchase the property, it seemed like an excellent opportunity. Ironically, when the NFSB first made an offer, Hooker's Executive Vice-President rejected it, stating "we should not sell the property in order to avoid any risks" (Colten and Skinner 1996: 158). Nevertheless, Hooker sold the property to the school board in 1953 for one dollar. The bargain price included a disclaimer stating that Hooker could not be held liable for damages resulting from the chemicals at the site (Gibbs 1998: 21). Residential development and the construction of an elementary school soon followed.

The story of the school's construction reveals more questionable actions. The initial excavation uncovered a number of drums of unknown chemicals; and although the architect in charge advised against building on the site altogether, the solution was to move the school a mere eighty-five feet north of the original (Levine 1982: 12). The school was completed in 1955. Even though complaints began almost immediately, the situation did not come to a head until the mid-1970s when residents began to complain of chemical odors in their basements, surfacing sludge, gapping

[73] Some residents also claimed that they had witnessed U.S. Army vehicles entering the site (Brown 1979: 22).

holes from eroded drums, exploding rocks,[74] and burning feet (Levine 1982: 15). No doubt sparked by increasing complaints, the *Niagara Gazette* published a series of articles (1976) about Love Canal. One of the reporters for the *Gazette*, Michael Brown (1979), poignantly describes what he witnessed:

> I saw where dogs had lost their fur. I saw children with serious birth defects. I saw entire families in inexplicably poor health. When I walked on the Love Canal, I gasped for air as my lungs heaved in fits of wheezing. My eyes burned. There was a sour taste in my mouth (xii).

The *Gazette* articles, in conjunction with the deteriorating health of her own son, led Lois Gibbs, a Love Canal resident, to take action. Her son[75] began having seizures soon after starting school (Gibbs 1998: 27). When efforts to transfer him to another school failed, Gibbs began organizing her community.

Ironically, the first investigation by a government agency was triggered by the presence of high levels of pesticide in Lake Ontario fish and not the complaints of citizens.[76] Public outcry, however, eventually led to an investigation of the Love Canal residential area by the City of Niagara Falls in 1977. This investigation found chemical contamination in 21 out of 188[77] basement sump pumps (Levine 1982: 15, 17). Based on these findings, health officials believed the situation was serious enough to warrant a public statement advising all pregnant women and children less

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[74] Phosphorus (Brown 1979: 6).
[75] A year later, Gibb's daughter was also hospitalized for health problems (Gibbs 1998: 28).
[76] The New York Department of Environment and Conservation traced the contamination to the Love Canal site and eventually filed suit because of a failure to respond (Levine 1982: 15).
[77] At the end of the day, over two hundred compounds, including twelve carcinogens, were identified at Love Canal (Gibbs 1998: 22).

than two years of age to leave the area (Levine 1982: 28). This announcement became the basis for a sustained effort to relocate all the residents of Love Canal. Residents claimed that if fetuses and young children were in danger, then so was everyone else. How could a line be drawn between those who would and would not be affected? Unfortunately, it took another two years of battling government officials to finally move everyone out of the area.

Residents encountered a series of "misunderstandings" with government officials and politicians. Even when Love Canal residents were invited to public meetings, they were not treated as participants (Levine 1982: 34). The fact that residents were excluded from the process was one of the greatest hindrances to speedily resolving the crisis. As it was, the rhetoric increased, but progress did not. In their frustration, Gibbs and other residents formed the Love Canal Home Owners Association (LCHOA)[78] (Gibbs 1998: 24).

There were fundamental differences in perspective between the residents on the one hand, and government officials on the other—a difference typical of "expert" versus "citizen" associations. Residents were driven by a desire to protect their families from the contamination. Although not all residents suffered harm, many believed that it was only a matter of time. In short, they believed that it was not worth the risk to "wait and see." Gibbs (1998) summed it up well: "I didn't see why

[78] The organization focused on homeowners because one of their primary concerns were declining home values and property tax issues. However, there were several other organizations (including a group of renters), some of which did not agree with LCHOA's tactics (Levine 1982).

you needed scientific certainty, when people's lives are at risk" (92). Government officials saw things differently.

State health officials attempted to convey an attitude of objective data gathering. Although Love Canal residents initially perceived health officials as allies, their self-portrayal as objective fact gatherers soon came under scrutiny. That is, their "objectivity" became increasingly difficult to believe in the face of their actions (or lack thereof). The New York Department of Health (NYDOH) dragged their feet on reporting data, "lost" results, and remained non-committal on the results they did report (Levine 1982: 110). These actions ultimately led Love Canal residents to believe that the NYDOH decisions were more political than scientific: "Every action at Love Canal, from the health studies to the final evacuation, was taken for political reasons. None of the decisions made were based on scientific evidence even though the evidence existed" (Gibbs 1998: 204). Thus, we see that regardless of the quantity and quality of data, the crux of the issue is that the data must still be interpreted.

With the exception of Congressman La Falce (D-NY), politicians were not much help either (Brown 1979: 16). They seemed to blow with the winds of popular sentiment. Governor Carey, who was facing re-election at the time of the Love Canal crisis, made statements under the media spotlight only to equivocate later. Away from the reporters, Carey altered many of his assertions, claiming for instance that he never outright said he would relocate residents (Levine 1982: 68).[79]

[79] Carey had publicly agreed to relocate the first two rings of homes surrounding the Love Canal (Levine 1982: 176—177).

In light of the statements and actions of government officials and politicians, it is easy to understand the lack of trust on the part of Love Canal residents, which "took hold when people began to doubt not only the virtues but the wisdom of the bureaucrats and their scientists and consultants" (Levine 1982: 22). The idea that the government existed to serve and protect its citizens had been severely tested and left wanting. The LCHOA summed up their sentiments in their organizational statement: "Government officials (specifically the EPA)[80] refuse to use its authority to force industry to properly dispose of their waste to protect our health and environment. Why? Because industry has power and money" (Gibbs 1998: 24-25). This statement leaves no question about who the LCHOA believed was behind the government's failure to act.

Although some residents had been temporarily relocated to motels as part of a remediation project, government officials continued to waffle on whether broad-scale relocation was necessary. In response, Gibbs (1998) explains how the LCHOA used every opportunity to gain media attention and keep their plight before the public's eyes (165). But it took the release of an EPA chromosomal study (May 1980) to convince government officials that a mass relocation was necessary (Levine 1982: 139). The study revealed that Love Canal residents had an abnormally high rate of chromosomal breakage—a key indicator of environmentally induced cancer. The damage was done, so to speak. It would take another five months before officials and

[80] Resident's attitude toward the EPA later mellowed to some degree. Compared to other agencies, the U.S. EPA did seem to be trying to help the residents. It was their chromosomal study that ultimately led to the relocation of residents.

politicians could reach an agreement about how to fund the relocation. In the interim, residents began to suspect they were headed for yet another round of "'ignore, deny, sound alarms, retreat and minimize' pattern of government intervention" (Levine 1982: 151). Officials attempted to discredit the results of the chromosomal study, but fortunately the wheels of bureaucracy had been set in motion. On October 1, 1980 the government offered to buy out the homes of all nine hundred plus families of the Love Canal community at fair market value (Gibbs 1998: 204).

The battle between Love Canal residents and government officials dramatically illustrates Feenberg's discussion of primary and secondary instrumentalization (chapter two). Citizens constantly tried to contextualize the perceived risks. After all, they were the ones actually smelling, tasting, and feeling the effects of the exposure from the chemicals buried in the canal. Using the media, they kept their plight before the public. Government officials, on the other hand, attempted to de-contextualize the risk by "scientifically" assessing data in terms of institutionally established standards. They were, in other words, using primary instrumentalization to differentiate the technological and social spheres. Citizens, on the other hand, utilized the four moments of secondary instrumentalization to combat the four moments of primary instrumentalization employed by technocrats (see chart one, chapter two).

After Love Canal

Unfortunately, it took an incident as tragic as Love Canal to motivate the existing powers to act. Congress had passed the Resources Conservation and Recovery Act (RCRA) in 1976 and the Superfund legislation (1980)[81] was underway when Love Canal came to the fore in 1978, so it was not the case that policy makers were unaware of the seriousness of the problems. However, no concerted actions had been taken to alleviate the massive problem of hazardous waste. In fact, all the EPA had accomplished by 1980 was to establish the severity of the problem. Their study revealed that over thirty thousand potential Love Canals existed in the U.S. (Gibbs 1998: 9).

As discussed in the previous chapter, mainstream reform environmentalists tend to support a legislative-regulatory approach to pollution control. The "cradle to grave" RCRA legislation is no exception. Wastes are tracked from the time they are produced until they are disposed of. Nevertheless, hazardous wastes must be discarded in some way, whether it is in a landfill or into the air via incineration. Industry favors the legislative approach for obvious reasons—it is easy to get around. Even if laws are passed, they must be enforced, and to do this regulatory agencies, such as the U.S. EPA or the Office of Safety and Health Administration (OSHA), must have funding. The Reagan administration virtually halted environmental enforcement by gutting the funding of regulatory agencies. In short, continuing to

[81] RCRA legislation mandates the monitoring and tracking of hazardous waste from its site of origin to its disposal. The Superfund program was implemented by the federal government to cleanup uncontrolled hazardous waste sites.

support the legislative approach enables industry to continue a "business as usual" attitude.

Grassroots environmentalists, on the other hand, take a direct approach, which forces industry to address the production processes generating hazardous waste. In contrast to the compromising approach of mainstream environmentalism, the grassroots approach is much more ready to draw a line in the sand. Larry Yates (2001), a Grassroots Organizer for the Center for Health, Environment, and Justice (CHEJ), explains:

> It's a very different approach, much more rough and ready, much more about power, much more about making things happen and not so concerned about what sort of relationship you have with Senator so and so, or their aide. So yeah, there's a difference between inside the beltway kind of approach [i.e., mainstream], an approach that doesn't mobilize grassroots people, and an approach that does. It's a big divide.

The toxic movement, spearheaded by CHEJ, facilitated dramatic changes in the way industry operates. Even though there were no laws preventing the land filling of hazardous waste (i.e., assuming all the permits and requirements were satisfied), the expense of doing so increased to such a degree that it was no longer cost effective. Industry had to "voluntarily" seek out ways of minimizing toxic waste (McAvoy 1999: 136), which is what led to the dramatic shifts in the handling of waste (see statistics above).

Local struggles between citizens and polluters have long existed, but prior to Love Canal becoming a national media event (1978) these struggles were sporadic and locally confined (Szasz 1994: 14). "The crisis at Love Canal awoke a nation, and to a lesser extent the world, to the hazards of toxic chemicals in our environment. Love Canal sparked a nationwide grassroots movement of people concerned about environmentally-linked health effects" (Gibbs 1998: 1). It is important to understand that the public's response did not come out of nowhere; they were primed for action when the media trumpeted Love Canal. The ideology behind the toxics movement was nurtured by a number of key authors in the 1960s and early 1970s.[82] Works such as Rachel Carson's *Silent Spring* (1962) and Barry Commoner's *Science and Survival* (1966) severely questioned the direction of modern science and technology was taking (Tesh 2000: 43). Love Canal simply confirmed what many already believed; that is, industry backed by government was poisoning America.

The media created an icon with their coverage of Love Canal (Szasz 1994: 52). Americans could easily identify with the media's—"this could be you"—portrayal of the event. Icons typically fade quickly in our post-modern fractured spectacle, but before the Love Canal incident could pass from the minds of Americans, Superfund legislation had been enacted and a new movement—Not-in-my-back-yard (NIMBY)—had begun (Szarsz 1994: 68). As local groups began to organize under the NIMBY banner, they soon established a unified front. The most

[82] For example: Galbraith 1958, Bookchin 1962, Goodman 1962, Marcuse 1964, Schumacher 1973.

significant development of this period was the emergence of activist networks. Groups such as the National Toxics Campaign and Greenpeace assisted in bringing local communities together (Szasz 1994: 71-72).

Gibbs was at the forefront of the new movement. In 1982 she used her experience from Love Canal to form a national organization—Citizens Clearing House for Hazardous Waste, now called the Center for Health, Environment and Justice (CHEJ). The many accomplishments of CHEJ include: (1) helping to pass legislation giving citizens the "right to know" what chemicals are in their community; (2) legislation that provides up to $50,000 per Superfund site for technical expertise; (3) a successful campaign to persuade McDonald's to stop using Styrofoam (Nader 1998: xiv). Their greatest achievement, however, is the closing over one thousand landfills and stopping hundreds of new waste incinerators—actions that ultimately contributed to increased recycling and the development of less toxic processes (CHEJ *Highlights*). Taken together, these actions have undoubtedly prevented numerous communities from sharing the same fate as the Love Canal residents.

These accomplishments are even more momentous given that they were achieved in the ultra-conservative 1980s, when mainstream environmentalism lost ground (Szasz 1994: 5). Unlike the successes of mainstream environmentalists, which have ebbed and flowed with the tides of Washington politics, CHEJ and the toxics movement continue in their achievements. For these reasons, it is worth exploring their strategies and methods in more detail. Where applicable, I attempt to relate these strategies to Feenberg's critical theory of technology.

Background Theory

In an effort to better understand how CHEJ operates, I interviewed Larry Yates, one of its grassroots organizers. Yates was in the beginning skeptical of my project, and of "theory" in general. He made it clear that CHEJ's focus was on the "practical" aspects of assisting local groups in their efforts to resist. However, most of Yates' skepticism came from a somewhat narrow definition of technology (i.e., as physical artifacts).[83] After clearing up this misunderstanding, he was at least open to my project.

Yates claims that CHEJ relies heavily on the civil rights movement as a model for their actions. He specifically mentioned Alden Morris's *The Origins of the Civil Rights Movement* (1984). A brief look at his work offers insights into how CHEJ and the toxics movement operate. There are obvious connections between grassroots environmental activism and Morris's portrayal of the Civil Rights movement. Morris draws on existing social theory—collective behavior theory, Weber's theory of charismatic leaders, and resource mobilization theory—to formulate his "indigenous perspective" (276). What sets the indigenous perspective apart, according to Morris, is the reliance on local (indigenous) resources in the early stages of the movement. In contrast to the resource mobilization theory, which holds that social movements must

[83] I will argue below that this narrow definition of technology is a genuine hindrance to extending the movement's success.

have the support of outside elites to even begin to act, the indigenous perspective claims that the impetus and resources for the initial organizing comes from within the community. Morris (1984) does not deny the role or need for outside support, only that its place is secondary (283).

Another key aspect of the indigenous perspective is the formation of a "local movement center." To establish such a center, Morris (1984) claims that the community must develop "an interrelated set of protest leaders, organizations, and followers who collectively define the common ends of the group, devise necessary tactics and strategies along with training for their implementation, engage in protest actions designed to attain the goals of the group" (284). The local movement center is therefore vital to establishing, maintaining, and spreading the movement.

Finally, the indigenous perspective illustrates that a middle-of-the-road style of organization—what Morris refers to as non-bureaucratic-formal—is the most conducive to facilitating a successful social movement. Movements must be organized enough to carry out their actions and accomplish their goals, but not so overly structured that strategic creativity is hindered (Morris 1984: 285).

Gibbs and the other Love Canal residents were not following a prescribed model; nevertheless they came together and formulated action plans that worked. At the end of the day their model strongly resembled the indigenous perspective just discussed. At various times, government officials, politicians, and media persons provided assistance to the group, but they were not the impetus for the movement. The motivation and leadership came from within. In addition, the way in which

Gibbs united with other residents to form a leadership team looked very much like the local movement center described by Morris. These actions can also be interpreted through the lens of Feenberg's critical theory of technology.

Strategies

Through their guidance literature, CHEJ offers step-by-step strategies for organizing to resist hazardous waste siting. The first step is to gather data to determine whether or not a group's suspicions are valid (CHEJ, *Leadership Handbook*). Community-Right-to-Know legislation mandates that records pertaining to hazardous waste storage, processing, and disposal be made available to the public. However, this is not enough; data must be interpreted to validate the threat posed by a given industry or hazardous waste site.

When crises such as Love Canal occur technical experts are called on to determine whether or not a genuine "problem" exists. If their interpretation of the data fails to indicate that there is a risk, then no such risk exists according to their technocratic interpretation—despite the "fire rocks," the burned feet of children, the acrid smell, or "ooze" in the basement of residents. Even after all the residents were relocated from Love Canal, the highly controversial Thomas Panel Report (Thomas, et. al. 1980) argued that there was never a threat to the residents of Love Canal (Levine 1982: 158). According to this study, there were no "statistical" differences

between the health of Love Canal residents and the normal population. The entire incident was blown out of proportion in the eyes of these technocrats.

For the residents, the fact that known carcinogens were leaching into their community provided sufficient evidence to act. Does it really matter if the "scientific" analysis of a substance found in the basement of a resident turns out to be within "acceptable" limits? A technical report will certainly differ from the description of a resident living with a constant chemical odor in their home. Experts tend to perceive risk as objective and quantifiable, while citizens take a much broader, qualitative view (McAvoy 1999: 119). The question, however, is what makes one assessment more credible than another? Feenberg's distinction between primary and secondary instrumentalization provides a useful language for discussing this. Recall (chapter two) his suggested use of the four moments of secondary instrumentalization (systematization, mediation, vocation, initiative) to combat the four moments of primary instrumentalization (decontextualization, reduction, autonomy, positioning).

Mainstream environmentalists, with their explicit ties to traditional institutions of science, tend to "decontextualize," and "reduce" the data (Tesh 2000). Using a narrowly defined conception of data, they extract information from the local context and reduce it to quantifiable terms. Technocrats, by employing primary instrumentalization, attempt to dominate and control nature by reducing it to the quantifiable. By distancing themselves (autonomization) from the objects of inquiry, technocrats are able to "position" themselves as the locus of power.

When instances such as Love Canal arise, the power disparities between technocrats, and citizens become explicit. Technocrats enter the seen far removed from the local context of the lived citizenry. They intermittently enter local communities to extract "objective" data, all the while maintaining a distance between them and the subjective lives of those affected. This approach has been largely successful for science and the beneficiaries thereof. The problem is that humans are also a part of nature. However, as the Frankfurt Schoolers argued, the domination of nature leads to the domination of humans (Leiss 1972). Grassroots identity politics, on the other hand, forces new conceptions of data and therefore new definitions of science.

Grassroots EJ operates on the premise that no one knows a community better than those who live there. CHEJ, importantly, recognizes the knowledge and insights of grassroots groups and accepts their assessment of the situation. In essence, citizens seek to "concretize" the data by connecting it to specific contexts. The widening definition of data generated by the lived experiences of grassroots activists offers new ways of tying data to health effects. Endless bantering about scientific data is resolved in the straightforward commonsensical recognition of the problem. Are they always correct in their assessment? No, but neither are the "experts" (Edelstein 1988: 183). The problem, however, is that health officials largely ignore indigenous knowledge as an important source of data and expertise (Tesh 2000: 98). The Love Canal crisis is a prime example.

Love Canal residents attempted to convey their knowledge of the situation to government officials. Residents conducted informal health surveys and offered other tacit, though important, information. However, this data was ignored by officials who failed to see it as a valuable source of local knowledge. Living next to the contaminated canal for years gave residents a store of information that no technocrat could ever hope to obtain. Because their tacit knowledge could not be quantified or statistically analyzed, it was considered useless to the experts (Edelstein 1988: 183).

CHEJ encourages grassroots organizations to bypass the debates that usually surround scientific data. Details about chemical toxicity, or the significance of release amounts are unknown to the majority of lay people; hence, this is the point at which most groups seek outside assistance (CHEJ *Leadership Handbook*). Although CHEJ has a Science Advisor to assist groups in this endeavor, they stress that groups should refrain from over-gathering data. "Information is not the hard part. The hard part is getting people to stop collecting information" (Yates 2001). If a significant number of individuals in the community are convinced of the problem, that is enough. Yates (2001) explains:

> But you see if the average person in the community gets it…that's what you need. Your base is with you. … You got twenty or thirty people together in a community, then I trust them … I say if those people get together, look at the evidence and they come to a conclusion, I'm willing to trust them with the conclusion.

Organizing

After the data has been collected and a majority of the group is convinced of the problem, the next step is to inform the rest of the community. "Fact Sheets," based on the research, are created and distributed door to door. CHEJ provides environmental track records on a number of major corporations. The goal is to bring together those community members interested in participating. Citizens make a genuine commitment to the cause in the initial meeting. Firm commitments are needed on the part of group members, because concrete actions are necessary to stop corporations from polluting (CHEJ *Leadership Handbook*: 19). Once a core group is established, various options must be weighed—legal action, continually to rely on regulatory agencies, or attempting to negotiate with the corporation involved.

It is most likely the case, however, that if the group contacts CHEJ, then other options have failed. Assuming that a corporation must be motivated in some way to respond, the only options are to either take legal action, or to organize and resist directly. For obvious reasons, CHEJ does not advocate legal action: "Hazardous waste decisions are political ones. Lawsuits are expensive, take a long time, and offer no guarantee of success" (*Leadership Handbook:* 27). Given that the community was most likely targeted because of its low socio-economic status in the first place, it is unlikely that the group would have the resources to resist legally.

If a participatory, direct-action model is decided on, goals must be established, committees created, and specific tasks assigned (e.g., research, fund-raising, and publicity). At this point, research is no longer to determine if there is a problem; rather, the focus is on "tactical research" to identify strategic targets (CHEJ, *Leadership Handbook*). Yates (2001) explains: "When I talk to people, what I'm primarily doing is going through power relationships. And I'm figuring out that essential question— 'who has the power to do what you need?'" These attempts by activists to situate themselves are analogous to the "initiative" moment of Feenberg's secondary instrumentalization. That is, they are countering the attempts of technocrats to "position" themselves outside the context by strategically targeting their centers of power.

Establishing and maintaining a strategy is emphasized throughout the CHEJ guidance literature. Yates (2001) states succinctly why this is important: "You've got to have a strategic focused campaign. You've got to use actual people to make actual social change. Social change doesn't happen in the abstract." CHEJ suggests four questions to guide groups in this strategic research: "(1) Who's responsible? (2) Who has the power? (3) Who answers to whom? and (4) Who profits?" (*Leadership Handbook:* 35).

Resisting

To assist groups, CHEJ highlights a number of corporate tactics, and suggests ways to respond (Collette 1989; 1993). Most obviously, corporations attempt to hide behind their self-created public image, which is one of the most important means of gaining entry to a local community. Because their livelihood depends so heavily on it, corporations invest huge amounts of time and money into protecting this image. For example, after the Exxon Valdez spill in Alaska, the Exxon Corporation invested millions of dollars in "environmental" projects and even more money in advertising to inform the public of its good deeds.

Another corporate tactic is to intentionally seek out areas inhabited by lower socio-economic communities (Collette 1989: 8-9). The Cerrell Report (1984) establishes that low-income, minority communities are often targeted by corporations for "Locally Undesirable Land Uses" (LULU). If and when opposition occurs, corporations frequently attempt to minimize the threat posed by their facility or hold out the carrot of economic development.

Finally, corporations may attempt to divide communities by supporting outside groups (e.g., mainstream environmental organizations) or a certain faction within the group (e.g., homeowners over renters). This tactic gives the impression that a corporation is attempting to cooperate, while at the same time increasing dissension within the group (thus increasing autonomization).

Groups can respond tactically to these actions in a variety of ways. First, they can make it clear to the community what the corporation is attempting to do. Hence, they must separate the public image of the corporation from their actions by

educating citizens about the true intentions of the corporation (Collette 1989: 8). CHEJ maintains "fact packs" on a number of corporations for this purpose. Groups can also inform their communities of how corporations intentionally target low-income areas for LULUs. These actions are, in Feenberg's terms, strategic ways of exposing the "technological hermeneutic" that corporations attempt to hide behind.

When corporations attempt to overcome opposition by minimizing risk (through "decontextualizing" and "reducing" data), groups should personalize, or "systematize," the threat. That is, make it explicit that the community residents are the ones that are subject to the risk and not the industry executives. Citizens thereby counter the attempts of technocrats to decontexutalize the data (i.e., risk) from their local context.

And the assertion that an industry, or hazardous waste site will bring new jobs and economic development is simply fallacious. Statistics reveal just the opposite—development that threatens the community is in the long run not life sustaining (Bullard 2000: 132). The jobs that are created are either high paying positions that require significant education and training or they are low paying, high-risk positions that few would want (Collette 1989: 13).

The most difficult task, but also the most important, is keeping the community unified. Holding together a strictly voluntary, democratically organized group is difficult regardless of the circumstances, but without a cohesive group, resistance is almost impossible. The leaders must keep the group focused on the goal. If an industry fails to respond to efforts to negotiate, the next step is direct action, that is,

non-violent media-directed events. The goal is to capture the full attention of the media with carefully planned and staged protests.

National Campaigns

CHEJ has duplicated the above organizing and resistance strategies over and over in communities throughout the United States. In the process, several national level campaigns have emerged. Yates (2001) explains how CHEJ's ongoing assistance to grassroots activism facilitated the development of these campaigns:

> Over time, out of the groups that we have worked with, networks have developed, contacts have developed and we promote that, we encourage that. And discussions have happened and all three of the campaigns came out of discussions that people had at the grassroots level had with each other.

CHEJ is currently involved in three national campaigns. The Child Proofing Our Communities campaign is an effort to transform the increasing concern about environmental risk and children into a broad coalition to improve the living condition of children (CHEJ *National Campaigns*).

The Health Care Without Harm (HCWH) project is an international campaign aimed at stopping health care providers from using products that emit toxic chemicals (e.g., dioxin) when incinerated. Since a large portion of medical waste is disposed through incineration, this is an important project (CHEJ *National Campaigns*).

HCWH has been a successful program chiefly because the campaign intentionally targets the health care industry's image. Yates (2001) explains:

> The angle is Health Care *Without Harm*. The name of the organization itself is a strategy, because all healthcare workers ... claim that they are trying to do this without harm. So when you say that, this is a challenge. We know you're harming people, and we know you can't admit it so we're putting you right in the middle of that contradiction… It's having a technique involved particularly for them.

The strategically chosen slogan of this campaign illustrates the way in which the media and the public image of an industry can be utilized to the advantage of an activist group.

The Stop Dioxin Exposure campaign is a multi-level effort to eliminate dioxin at its sources—waste incinerators, paper mills, and chemical manufacturers (CHEJ *National Campaigns*). It represents an excellent example of the well-worn slogan, "think globally, act locally." The program emerged from local activists who were seeking more leverage to apply to industry.

> In the dioxin campaign people came together and said we're fighting incinerators, we're fighting PVC, we're fighting a lot of different things all of which has this common thread—that dioxin is being emitted into the environment. If we go after dioxin it will give us a way to have some leverage on these different polluters that are operating in our

> communities … For the EPA to crack down on dioxin would be a handle that they could use (Yates 2001).

Through the Stop Dioxin campaign, CHEJ has helped local groups connect with national and international efforts to eliminate dioxin production. For example, under pressure from local activist groups, several cities in California passed ordinances banning dioxin production within their city limits (*Center for Environmental Health*).

Dioxin is just one of a number of "persistent organic pollutants" (POPs) targeted by the International POPs Elimination Network (IPEN). CHEJ has worked to unite grassroots, activist-based networks with the international effort to ban POPs, such as dioxin. Yates (2001) explains how this helps at the local level:

> The international process around POPs has put pressure on the U.S. to be stronger, particularly around dioxin. Because one of the key issues or debates for getting this international treaty was the issue of calling for the elimination of the production of dioxin … When you work out the elimination of dioxin, which is part of the treaty, then you're pushing all of these issues at the local level. It's a tool.

Indications are that this program is making progress. The POPs Treaty, which requires the elimination of twelve toxic chemicals, was recently (2001) signed by more than one hundred nations, including the United States (United Nations Environment Program 2001).

The toxics movement is now both local and global. Beginning with a small group of committed citizens, Lois Gibbs achieved the objectives of Love Canal residents, then went on to establish a national organization aimed at assisting local groups in organizing and resisting threats to their own communities. The emergence of international campaigns from CHEJ's grassroots work completes the picture.

Conclusions

The toxics movement represents one of a few instances in which an entrenched technological system has been forcibly transformed into something less threatening. The strategies used to accomplish this transformation resonate in many ways with Feenberg's critical theory of technology. Recall that there is a micro and a macro level aspect to Feenberg's politics of transformation. In particular, the description of the ways in which local groups engage and resist industries is analogous to Feenberg's discussion of the "micropolitics of technological transformation." His distinction between strategic and tactical actors, his concept of a technological code, and especially his theory of instrumentalization all resonate with CHEJ's strategies.

CHEJ encourages groups to focus on identifying power relations by asking pertinent questions, such as who profits, or who is responsible? Its goal is to determine where pressure needs to be applied—what they refer to as "strategic"

targets. To use Feenberg's terms, they are countering the "positioning" attempts of strategic actors with their own "initiatives."

The blockade against new hazardous waste landfills by grassroots activists increased the cost of waste disposal to such an extent that industry was forced to create technological alternatives. A significant point is that "those new technologies are emerging and they are emerging precisely not because science is coming up with new ideas or because industry is creative, but because of political pressure from the grassroots has concretely brought these new technologies into use" (Yates 2001). From Feenberg's perspective, the toxics movement forced the existing system to move from a highly differentiated to a more a concretized system through the moments of secondary instrumentalization.

Although grassroots activists do not explicitly set out to transform technology, nevertheless this is the end result. Technological systems are what must be altered for their living conditions to improve. Industries, landfills, and incinerators are the parts of technological systems that although not easily altered, are at least easily confronted by willing citizens. The methods described in this chapter offer straightforward ways of engaging these technologies. However, as discussed above, technology is a multi-layered entity. In addition to the physical artifacts themselves (e.g., incinerators), technology also exists as "ideology," or what Feenberg refers to as a "technological hermeneutic."

To some extent, the toxics movement confronted technology as ideology by attacking the public image of corporations. Highlighting the fact that industries target

low-income minority communities is one way of exposing their agenda. Nevertheless, it is an oversimplification to claim that industry and government are working together to exploit poor, minority communities. Feenberg offers ways to deepen this critique. To what extent have activists bought into a technological consciousness that hinders their perception? With his suggested technological hermeneutic, Feenberg offers ways of probing the reified consciousness that activists too readily accept.

Citizens resisting industry and hazardous waste sitings must also see technology as "social process." This form of technology is much more difficult to resist, namely, because citizens themselves embody and are embodied by the technologies. They are an extension of the very technologies that threaten their communities. The lifestyles of citizens as consumers, perpetuates the pollution that threatens their communities. Unfortunately, citizens rarely see this contradiction, because they are so deeply embedded in the technological systems affecting their lives. These are important challenges that Feenberg does not adequately address either.

When citizens confront a crisis such as Love Canal, the American dream, which is closely linked to the ideology of technological progress, is called into question. However, if the solution demanded by citizens entails compensation and cleanup but no deeper change, then they thereby "institutionalize and legitimate as a problem what might otherwise be viewed as a fundamental crisis and, thus a challenge to our modern industrial way of life" (Edelstein 1988: 194). The way of

life—a social process concretized by technological systems—is what must be altered.

The theory of technological commodification discussed in chapter three can address some of these issues. In addition, the Western Marxist tradition has from the beginning made the connection between technology and social forms (between the forces of production and the relations of production), and offers ways of thinking about technology that can enhance the rather simplistic view held by many grassroots activists. The final chapter discusses in more detail how a critical theory of technology can expand on the somewhat successful efforts of grassroots environmentalists.

Chapter Six

Human Need, Commodification, and Sustainable Societies

The stated purpose of this project is to determine whether or not environmentalism can fruitfully connect with Feenberg's critical theory of technology. To put it another way, I am attempting to establish which environmentalism resonates most with his theory. A modified version of Feenberg's theory has been outlined, and grassroots environmental justice (EJ) has been identified as the brand of environmentalism that most resonates with his theory. The case study of the toxics movement illustrates EJ as an instantiation of Feenberg's theory.

Again, what I am presenting here is both normative and descriptive. While it is true that the toxics movement is an instantiation of Feenberg's critical theory of technology, it is also the case that the critique must go deeper. In this final chapter, I focus on the organizational structure of the toxics movement, and suggest more specifically how a critical theory of technology can enhance movements such as this. I argue that seeing the connection between production and consumption is crucial to linking environmentalism to a critical theory of technology, and that this connection necessitates a theory of human need.

Structure of the Toxics Movement

As discussed in chapter three, one of the shortcomings of Feenberg's theory is the inability to expand transformation beyond the immediate interests of those engaging technology. He locates the interests and motivations for action within the participants, which hinders expanding the transformation once these interests are satisfied. There must be something motivating actors beyond the immediate interests of the participants.

In that CHEJ provides guidance throughout the United States, it has the potential of expanding these engagements. CHEJ offers guidance on organizing and resisting to local groups, who in turn use this knowledge to directly engage technology. Organizations like CHEJ offer an existing structure for connecting disparate local struggles. Through their national campaigns (e.g., Stop Dioxin Exposure), CHEJ is able to target specific technologies and unite local activists around a common cause. Hence, expanding the implementation of Feenberg's critical theory of technology would not require local activists to become intimate with the theoretical aspects discussed here. As long as CHEJ's guidance reflects the insights of this theory, activists could begin to practically employ them in their struggles.

Recall that Feenberg's critical theory of technology operates at both a macro and a micro-level. The macro-level focuses on technology as ideology or hermeneutic, while the micro-level emphasizes the direct engagement of technology.

We see this same division in the toxics movement. At the micro-level, local groups are involved in engaging and resisting technologies. They are in effect attempting to reverse the process of differentiation that is negatively affecting their lives. At the macro-level, the toxics movement attempts to combat the technocratic power of the government officials, bureaucrats, and corporations that attempt to exploit local communities (see Figure 1).

As I see it, the micro-level is clearly the strong point of the toxics movement (and similar grassroots EJ efforts). Such movements are action oriented, extremely motivated, and increasingly well organized thanks to organizations such as CHEJ. The macro-level of hermeneutic, on the other hand, is clearly lacking—activists must be more reflexive in their engagements with technology.

Combating Technocratic Power

Feenberg's theory of instrumentalization has the potential of significantly aiding grassroots activists in their battles with technocratic power. The struggle between grassroots activists and technocrats reflects his discussion of primary versus secondary instrumentalization (chapter two). When technocrats—government health officials, scientists, and policy makers—use non-coercive power to alter citizen preferences, they employ a form of technology as ideology that must be overcome (McAvoy 1999: 62). The history of the toxics movement offers scattered instances of overcoming technocratic power. As the Love Canal incident illustrates, the

perspective of technocrats fundamentally differs from the perspective of citizens. Technocrats employ science and technology to make rational-objective decisions based on easily quantified data. Given that technocrats generally believe environmental problems can only be isolated and solved by their methods, they tend to preclude citizen participation (Edelstein 1988: 191). Their ideology, in other words, pre-selects for particular interests and restricts alternatives (Webler et al. 1992).

Citizens, on the other hand, put safety over profit, and believe that those bearing the burden should be included in the decision making process. The difference in paradigms is what leads technocrats to view citizens as irrational, "screamers," and citizens to see technocrats as cold, and "corrupt" (Edelstein 1988: 129, 132). Webler et al. (1992) explains how this bifurcation is largely due to the prevalence of instrumental reason among technocrats:

> Corporations and government speak each other's language. Instrumental reason has become the predominant mode by which technical risk analysis justifies actions. But citizens do not comprehend risk problems using instrumental reason: citizens do not calculate the marginal cost of saving a life (31).

Technocrats have the power and the benefits that come with that power. The playing field is not equal; therefore the interests of the technocrats must be exposed to level the field. Instantiations of instrumental rationality are real. They are identifiable in

the words and actions of technocrats, and are tied directly to the highly differentiated technologies threatening the lives of citizens. Webler et al. (1992) explains that:

> normatively, a commitment to instrumental reason is a commitment to domination. The question "Who bears the risk and who reaps the benefits?" will expose the political realities of this domination. Those interests that command scientific knowledge, or are able to pay for it, will reap the benefits, while groups poor in scientific rationality will take the burden (35).

But this characterization is too general. As illustrated in chapter five, Feenberg's four moments of primary instrumentalization offer a more in-depth analysis of the language and actions of technocrats. Once identified, activists can respond strategically with the four moments of secondary instrumentalization.

Expanding the Critique

The toxics movement is a good example of how EJ movements can reshape technological systems by combating technologically based threats. By blockading new hazardous waste incinerators and landfills, the toxics movement forced industry to develop new production processes and reduced hazardous waste. But there are problems with this approach: at best it works as a system of containment, at worst it ends up spreading the waste around. Because these systems remain differentiated,

they are easily transferred to other unsuspecting communities in the United Stated, and abroad.[84]

One of the central arguments against globalization (i.e., in terms of "free trade" and economics) is the lack of uniform environmental standards. Multinational corporations are free to skate around the globe, polluting at will. As a consequence, many of the "dirtiest" industries are moving overseas. Hence, even though activists frequently unite to prevent industries from targeting communities in the U. S., they cannot stop these industries from taking their waste elsewhere. Regardless of where or how they "stop-up" the system, it will continue somewhere and in some way unless efforts are made to further concretize these systems.

Crucially, EJ activists must understand that technology is not simply the by-products of the artifact that they see threatening their lives—the incinerator that an industry attempts to put in their backyard—but the entire process, or system, that supports this artifact. The research and development that designed the processes and products, the manufacturing process that created the waste, and the transportation system that ships the waste are all part of the technological system that brings the incinerator to bear on a local community. This complex web of people and machines must be sorted out. One way of doing this is to examine the history of particular technologies from a critical theory perspective.

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[84] The Cerrell Report (1984) demonstrates that certain communities are targeted for their perceived inability to resist.

In chapter three, I discussed how electric power became entrenched through technological "standardization" and the "positioning" of a few managerial elites. In Feenberg's terms, electric power became increasingly differentiated as technocratic managers "decontextualized" electric power technology to achieve their ends. This path was justified by the inherent norms of "utilitarian efficiency" (formal rationality). The argument for leaving these utility systems alone was based on the fact that they could be counted on to efficiently deliver relatively inexpensive energy. Few thought about how these monopolies established deeply entrenched systems that would be difficult to alter.

Richard Hirsh (1999) explains how the deregulation of these systems began in the 1970s. Many factors contributed to this shift—the energy crisis, a change in public perception, and new legislation. An unintended consequence was that it opened the door for alternative energy and technology. Although this movement[85] as such did not continue, largely because of the Reagan administration, it did set the stage for later developments. With further deregulation in the 1990s, considerable progress toward developing alternative power sources has been achieved.[86] These efforts to develop and implement alternative power illustrate ways of "re-contextualizing," or concretizing technologies into particular social and environmental contexts. The systems are, in other words, becoming less-differentiated through these efforts.

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[85] I am referring here to a fairly distinct movement that originated from the energy crisis in the early 1970s, and received substantial support under the Carter administration.
[86] Wind power, for example, increased four fold from 1995-2000 alone (L. Brown 2001).

Thinking about technological systems in this way provides activists with alternative ways of transforming technology. For instance, if a local group were confronting a coal-fired electric power plant in their rural community, they would greatly benefit from this broader perspective. Attacking the source—the smokestack emitting the pollution—is one way of attempting to achieve the goal of a cleaner community, but it is extremely limited. Local activists could, for example, push for deregulation, which potentially lessons the burden on their particular plant. Or, they could advocate for alternative energy sources, so that when opportunities do arise (e.g., the 1990s) options would be available. Again, many activists do not consider these alternatives because they are typically too narrowly focused on stopping the by-products of particular technologies.

The way in which national campaigns (e.g., Stop Dioxin Exposure) emerged from the struggles of grassroots activists (chapter five) demonstrates the effectiveness of this approach. CHEJ assisted in the development of these programs based on the struggles going on in local communities. In the case of dioxin, for example, combining legislative initiatives with the force of grassroots activism resulted in an extremely effective package. Crucially, however, the impetus for change was from the bottom-up.

Connecting Production and Consumption

Although grassroots EJ clearly reflects Feenberg's discussion of the micropolitics of technology, there are significant differences as well. Feenberg (1999) suggests that interests originate in the participants (140-142). For example, Internet users with chronic medical conditions have constructed on-line patient forums to share information and console one another (Feenberg 1995b). In instances such as this, participants proactively shape the system to meet their needs. In the case of the toxics movement, and EJ in general, citizens are motivated by a perceived threat. They engage technologies to prevent their implementation, and not necessarily to fulfill a need. Another way of saying this is that Feenberg's participants focus on consumption, while EJ focuses more on (by)production.

On the face of it this may not seem problematic, but ignoring the fact that these two are inextricably linked is a central problem for EJ. For the most part, grassroots activists are content to maintain the status quo as long as the immediate threat is eliminated. Citizens must realize that their consumptive habits fuel the technologies, which in turn negatively affect them. They must, in other words, make the connection between (by)production and consumption. The toxics movement, like most EJ movements, is motivated by the idea that they have a right not to be "dumped on." What such activists appear to say is "I deserve a toxic-free life so I can make as much money as possible, so I can pollute some one else's world." But this is fictional if the so-called better life creates their problematized situation. Although the majority of Americans consider themselves environmentalists, "their lives are so compartmentalized that they live a lifestyle that supports the pollution habit, without

even seeing the connection" (Edelstein 1988: 194). The compartmentalized lives are tied directly to modernity's highly differentiated societies and prevent them from seeing that they are invested in the very technologies responsible for the polluting.

The neo-liberal solution of placing more responsibility on the individual is not the answer. Pushing individual citizens to conserve energy and recycle waste, as well intentioned as this may be, is simply moving in the wrong direction. It serves merely to accentuate the radical individualism that undoubtedly contributes to American's failure to effectively respond to environmental problems. A collective approach is needed; and in a highly technologized society, it makes sense to organize around technology.

Citizens must see themselves as the living material of technological systems—as social process. Grassroots EJ relies far too heavily on an "us-versus-them" model. In truth, activists embody this division, and hence fight against themselves. In relying on this bifurcated model, activists reify the division that must be overcome in order to make the kind of changes necessary. Citizen-activists must see that they are part of the very systems that threaten their way of life. The root of this problem is a failure to make the connection between production and consumption. James O'Connor (1998) sums up the possible consequences of this failure:

> The danger that [struggles against technology] will be sidetracked into technocratic and reified ways of thinking about the world and capitalist power is great. Not only technology per say but also the prevailing division of mind and manual worker along class, race, and gender

> lines, and the democratization of regulatory agencies and state and international bureaucracies, are at stake (208).

CHEJ's guidance literature looks like a tirade against "capitalism" and "corporatism." Maybe these are to blame but what exactly do these terms mean, and what is their connection to technology? These reified terms must be probed in order to find practical solutions. Their strategies attempt to target the locus of power (i.e., corporations) which is fine, but how are corporatism, capitalism, and technology tied together? What products contribute to the waste? Who buys these products and for what purpose? Asking these questions reveals the connection between the corporate producers and the citizen consumers, and leads to the crucial subject of "human needs." That is, how are they defined, and by whom?

Human Needs and Satisfaction

Environmentalists have attempted to address this subject in various ways, but they have focused primarily on constraining the human appropriation of nature. The question concerns the best way of achieving this constraint. One of the chief ways is to assert the "limits of nature," that is, to argue that nature is being depleted of non-renewable resources (i.e., sump), or conversely that nature can only accommodate so much pollution (i.e., sink).[87] Accepting this means that humans must alter their

[87] This is clearly rooted in the conservation-preservation history of mainstream environmentalism (see chapter four).

consumptive (polluting) habits to some degree. One problem with this approach is that establishing and controlling limits tends to fall back on systems involving primary instrumentalization, thus perpetuating the problem. Emphasizing "limits" also fails to adequately address the connection between human need and the appropriation of nature (via technology) as the satisfaction of that need.

The issue of needs and how they are satisfied has been an important topic within the Western Marxist tradition since the early Marx, where he envisaged a dialectic between humans and external nature that is mediated by technology. According to Marx (1964[1932]), humans objectify their species being in and through their creations—their appropriation of external nature—and contemplate themselves in the worlds that they create (114). The given mode of production and corresponding social organization frames the way in which nature is appropriated. Obviously, a major factor is the perceived "needs" of the individual and the community to which she belongs. Marx (1970) explains:

> Hunger is hunger; but the hunger that is satisfied by cooked meat eaten with knife and fork differs from hunger that devours raw meat with the help of hands, nails and teeth. Production thus produces not only the object of consumption but also the mode of consumption, not only objectively but also subjectively. Production therefore creates the consumer (197).

In other words, what is produced and how it is produced plays a crucial role in defining the needs of consumers. There are no pre-givens. Every society has a particular way of engaging nature with technology to obtain their "perceived" needs.

According to Marx, the capitalist mode of production reduces human needs to the basest elements, because it alienates the worker from the product of their labor. In this we see the origin of the split between production and consumption, with production becoming veiled by the commodity form.[88] The worker is reduced to basic biological needs because they are forced to labor simply in order to survive. Marx (1964[1932]) claims that under these conditions, "man (the worker) only feels himself freely active in his animal functions—eating, drinking, procreating, or at most in his dwelling and in dressing-up, etc" (111). Reduced to simply working to satisfy physical needs, humans become no different than animals. Conscious free activity distinguishes humans from animals. According to Marx (1964[1932]), the needs above and beyond basic needs are uniquely human, such as the need to create, to accomplish, and to commune with others.

True production in the creative sense imagined by Marx means more than meeting immediate physical needs. The richness of human sensibility is achieved through freely interacting with "humanized nature," that is, through the process of creatively satisfying needs by appropriating external nature. According to Marx (1964[1932]), "the whole character of a species—its species character—is contained in the character of its life activity; and free, conscious activity is man's species character" (113). Conversely, when humans are reduced to "practical need," as

[88] See chapter three for a discussion of "commodity form."

occurs under capitalism, human sensibility becomes severely stunted (Marx 1964[1932]: 141).

Under capitalism "everyone speculates on creating a *new* need in another … to place him in a new dependency" (Marx 1964[1932]: 147). Who we are is equated with what we can buy, that is, with money and how much we possess. "Need" is defined by money, if the possibilities for satisfying needs are determined solely by the quantity possessed by an individual (Marx 1964[1932]). So framed, the universal solvent of money eliminates individuality.

Marcuse (1964[1932]) expounds on Marx's ideas in his discussion of how advanced technological society replaces "true needs" with "false needs." False needs are "those which are superimposed upon the individual by particular social interests in his repression: the needs which perpetuate toil, aggressiveness, misery, and injustice" (Marcuse 1964[1932]: 5). Clearly, with the rise of modern technological societies "nature," and "production" have become engulfed by large technological systems. As a consequence, "need" and "satisfaction" create and sustain these systems. As such, needs and satisfactions preserve the power and domination of the established authority. In this sense, the domination of rationality goes to the very core of human existence. In the technologically constructed one-dimensional society humans are conditioned to want what they get.

Through targeted advertising, they are dazzled into believing that freedom equates to the ability to choose between twenty different kinds of toilet paper, or that

the possibility of owning the same kind of automobile as the "boss" dissolves inequalities. The example of electric power (chapter three) dramatically illustrates how a technological consciousness was instilled in people by playing on the Baconian mantra of "technology equates to material progress."

Marcuse (1964[1932]) argues that at the root of the struggle for liberation is "the replacement of false needs by true ones, the abandonment of repressive satisfaction" (7). The question is how to achieve this replacement in a society eclipsed by a technological consciousness—where citizens are trained to buy every new techno-gadget that comes along. It is one thing to say that the majority of Americans are caught up in overconsumptive, technologically fetishized lifestyles; it is quite another to suggest how this can change. Grassroots activists of the kind discussed here at least offer the potential of making these changes. However, the assumptions behind the prevailing technological consciousness must be exposed for citizens to see who they are, and how their needs and satisfactions are constructed.

Feenberg's theory of instrumentalization is simply inadequate in this regard. Recall that he advocates moving from highly differentiated technologies to less-differentiated, more concretized technologies. If the immediate interests of participants guide the movement toward concretization, as his examples illustrate, nothing prevents the takeover and concretization of fetishized consumerism. That is, everyone is happy as long as they get what he or she wants out of a particular technology. Unfortunately, what people typically want is more!

I believe these shortcomings can be overcome with two additions, or modifications. First, it is more useful to frame this movement toward concretization (via secondary instrumentalization) in terms of commodification. If it is the case, as I have argued here, that much of the environmental destruction (and threat to human health) comes from large, commodified systems, then moving toward less-commodified systems should be an improvement (alternative energy being one example). I am suggesting that the way in which EJ activists engage technology has the potential of creating less-commodified systems, but to be effective they must better understand the commodification process.

Thinking about technology as a commodity that is bought and sold encourages actors to consider the role of consumption. Paul Thompson's theory of technological commodification discussed in chapter three is helpful in this regard. Thompson's four moments of commodification—alienability, excludability, rivalry, standardization—provide a way of connecting needs and interests to specific technologies and the products generated by particular systems. In addition, his distinction between "structural" and "technological" commodification enables activists to target specific aspects of technological systems. It may be the case that structural issues, such as policies and laws, are to blame for the commodifying (differentiating) aspects of a particular system. Hirsh's (1999) analysis of electric power demonstrates that structural commodification, in the form of regulations, largely prevented (excluding) alternatives. However, as Hughes (1983) points out,

there are many technological factors that also contributed to the commodification (e.g., in terms of standardization, and excludability) of electric power systems.

Pollution as a by-product of technological systems can be considered in a similar way. EJ has touched on these issues by revealing how certain communities are targeted for their perceived inability to resist. However, these efforts could be greatly enhanced with Thompson's discussion of the four moments of commodification. They could, for example, tie hazardous by-products with those attempting to "exclude," or "alienate" from the beneficial aspects of a system.

My second suggestion pertains to the goal or direction of such movements. I believe the type of technology that should be held up as a goal is represented by many of the northern European countries—that is, large-scale, yet sustainable systems. Granted, the term "sustainable" has been co-opted by technocrats, and used to justify virtually any kind of development. However, if the goal is to in some way achieve an equitable stasis of human life on earth, then some degree of resonance with natural systems must be achieved. I am not claiming that efforts to move toward small-scale, regionalism should be given up. Obviously, smaller scale systems are easier to control and alter. When possible, efforts should be made to keep systems from expanding to the point of no control (i.e., where systems take on their own imperatives). However, as I have argued, environmentalists tend to act only after confronted by the threat from mature, large-scale systems.

Of course, the American path to large-scale, sustainable systems would be radically different than European countries, which are for the most part Social

Democracies with large, bureaucratic governments. In the United States, the most likely path to large-scale, sustainable systems would be grassroots-populist based. It would, in other words, be a bottom-up movement. Combining grassroots EJ's proven success at the local level with an overarching goal of sustainable systems, has the potential of greatly expanding technological transformation.

It is also possible that transformation can be expanded through new movements directed at globalization, and climate change. Many of these activists recognize that the overconsumption of the few fuels problems like global warming and Third World exploitation. Moreover, technology (or development) is seen as driving or at least enabling these problems. These movements would need to be examined separately to determine whether or not they can connect with the suggested critical theory of technology. Obviously, the ideological commitments and strategies for action of these movements differ from those discussed here. However, this at least provides avenues for further research.