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Peak Oil and Transition: The Making of a Documentary Video

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PEAK OIL AND TRANSITION:

THE MAKING OF A DOCUMENTARY VIDEO

by

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CERTIFICATE OF APPROVAL

I certify that I have read PEAK OIL AND TRANSITION: THE MAKING OF A DOCUMENTARY VIDEO by John A. Duvall, and that in my opinion this work meets the criteria for approving a dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Humanities with a Concentration in Transformational Learning and Change at the California Institute of Integral Studies.

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ABSTRACT

Many scientists and academics have raised serious concerns regarding the depletion of fossil fuels—especially the peaking of oil production—and its impact upon society. According to these researchers, oil for transportation and production will soon become expensive and scarce, and known alternative sources of energy will be insufficient to make up the difference within the required time frame. Therefore, world civilization (and the United States in particular) will soon undergo a crisis in energy supply that will have significant impacts on the structure of community life, economic wellbeing, political organization, and individual lifestyles.

One response to these threats is to attempt to develop mitigation strategies for communities that involve strong conservation measures and relocalization of crucial necessities like food and energy production. During the past decade, many Sustainability and Transition organizations have been formed by citizen activists to educate their citizens about the challenges of peak oil, and to evolve approaches to overcome them.

The primary purpose of this dissertation is, through a documentary video production, to examine the likely impacts of peak oil and to investigate strategies for promoting community resilience, focusing particularly on the emergence of

Sustainability and Transition groups in northern California. The method of the inquiry is participative action research, employing interviews with scholars and community leaders on the subject of peak oil and strategies for community adaptation.

The primary components of this documentary are video interviews and supporting footage, with the objectives of explaining the concept of peak oil; demonstrating why alternative technologies may prove insufficient to replace fossil fuels; examining the potential economic, social and psychological impacts of energy shortages; and demonstrating the process of activist organization in pursuit of strategies and tactics to promote community resilience. In particular, this research focuses on representatives of organizations that study the impacts of peak oil, such as the Post Carbon Institute and Post Peak Living; and Transition and Sustainability initiatives in the northern California counties of Marin, Sonoma, and Mendocino.

KEYWORDS: Peak oil, climate change, transition, documentary, sustainability, relocalization

DEDICATION

This work is dedicated to my father and mother, Leslie and Carolyn Duvall, who nurtured my devotion to public service and supported my dreams of a career in filmmaking; and to the late Marin County Supervisor Charles McGlashan, a visionary who proved what one person can achieve for their community with intelligence, hard work and the ability to inspire others.

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CHAPTER ONE:

INTRODUCTION

Fossil fuels are nonrenewable resources that will inevitably become scarce. Over the past decade, many scientists and academics have advanced the theory of *peak oil*, a belief that within the coming few decades, world production of oil (and thereafter natural gas and coal) will peak and begin to decline, leading to rapidly accelerating fuel prices and shortages. As a consequence, the world's energy supply may soon undergo a radical transformation that will significantly impact economic wellbeing, governmental policies, the infrastructure of communities, and daily patterns of life. As worldwide demand for oil rises while worldwide production begins to decline, many Americans are beginning to ask whether they will be able to afford the future costs of traditional sources of energy—assuming that supplies are even available at any cost.

In order to investigate this topic I have produced a feature-length (90 minute) video documentary production, composed primarily of interviews with energy researchers and community activists, with the purpose of demonstrating the magnitude of the problem of peak oil and the activities of community activist organizations in the pursuit of social and political change. The organization of both this paper and the documentary video follow the same general outline, addressing the following questions:

The Power of Oil: What fundamental role does energy from oil play in modern civilization?

What is peak oil? What is the scientific theory and historical evidence behind projections for an immanent worldwide decline in the supply of oil?

What About Alternative Energy? What emerging energy sources are proposed as alternatives to oil, and what is the likelihood that they may adequately fulfill rising worldwide demand for energy?

Impacts - What are the likely economic, political and social consequences arising from peak oil, and how damaging could they be for society?

Psychology: How are people likely to respond to the socioeconomic crisis resulting from peak oil?

Powerdown: What strategies may communities and governments employ to effectively respond to the challenges of peak oil?

Transition: What practices and tactics are activist sustainability and transition groups employing to promote adaptive responses to peak oil in local communities?

I have been concerned about the possibility of fossil fuel depletion for over three decades, dating back to my first reading of the original edition of *The Limits of Growth* (Meadows, Meadows, Randers & Behrens, 1972) in the mid-1970s, and have been studying the issue of peak oil since 2005. In 2007 I became directly involved directly as a volunteer with Sustainable Fairfax (www.sustainablefairfax.org) and Sustainable San Rafael (www.sustainablesanrafael.org), activist citizens' groups in two northern California towns that are seeking to promote sustainable environmental policies within the political and cultural arena. In 2008 I joined with Andre Angelantoni

and Jonathan Frieman in founding Post Carbon Marin, a group with the goal of educating citizens and public officials about the reality and potential impacts of peak oil. Thus I have developed a familiarity with the principles and practices of on-the-ground environmental activism. I also have an enduring interest in intentional community, having visited such noted communities as Twin Oaks (http://twinoaks.org) and Earthhaven Ecovillage (http://www.earthaven.org), and have acquired a basic understanding of their social organization and resource economies, which I believe may have relevance for future community adaptation to the effects of peak oil.

I am currently employed as Assistant Professor of Communications at Dominican University of California in San Rafael, California, and my area of specialty is in the teaching of film and video production and writing. Thus the production of a video documentary was a crucial element in order to establish my doctoral work as appropriate to my area of teaching. Regarding my qualifications as a video documentarian, I earned an MFA in Cinema Production from the University of Southern California, where I also served as Teaching Assistant to ethnographic filmmaker Dr. Timothy Ashe, from whom I learned valuable lessons about the craft of documentary filmmaking. I worked for a decade in feature film postproduction in Hollywood (including films for most of the major studios); produced news packages for a PBS affiliate in Bloomington, Indiana; and worked in local documentary production for Community Access Television (CATV) stations in at least three different locations. I have extensive experience as a teacher of film production (including the documentary form) in my career as

Assistant Professor of Communications, first at Elon University in North Carolina, and currently at Dominican University of California. Through my current university I gained access to all the camera equipment and editing resources that I needed to produce a high quality video production.

The purpose of this paper is two-fold: first, to provide a literature review establishing a conceptual foundation for understanding the significance of peak oil, its potential impacts for the economic and social infrastructure of our communities, and the various strategies for mitigation of these negative impacts; and second, to provide an overview of the method, planning, production and evaluation of the video documentary that is the core of the dissertation. Integral to this effort is an awareness of the initiatives arising in northern California communities to promote community resilience in a peak oil environment, and of the significant thinkers and organizations upon whose research these projects build. An examination of the attempts of these northern California organizations to promote community resilience is the concluding focus of this documentary.

Sources of background information included basic research on peak oil theory and climate change; documentation related to the genesis and activities of activist movements; video interviews with recognized experts, public officials and citizen activists; and personal observation of meetings and activities related to the goals of these organizations. This study is not intended to contribute substantively to theories of peak oil or climate change, but rather assumes their general premises. Neither is it intended to provide a comprehensive overview of

the transition strategies of other communities, but instead to describe multiple case studies of how some activists approach the challenge of confronting peak oil.

The analysis of human energy consumption encompasses a vast number of variables and interactions, systematically weaving together a number of academic disciplines, including geology, chemistry, ecology, economics, political science, sociology, anthropology and psychology. The challenges posed by peak oil need to be viewed in the context of general theories of social change, the influence of technology on social organization, and the dynamics of rapid cultural change and collapse. Specific areas of research include energy technology, population ecology, ecological economics, and the social and individual psychology of dealing with cultural crisis.

One important dimension of my research has been an examination of documentary film and video work by others, particularly those dealing with environmental issues. Many such works have been produced in the last decade, including *The End of Suburbia* (Silverthorn & Greene, 2004)*, An Inconvenient Truth* (David, Bender, Burns & Guggenheim, 2006)*, A Crude Awakening* (Gelpke & McCormack, 2006)*,* and *The Power of Community* (Morgan, 2006). All of these productions offer cinematic models of how to approach topics of energy and ecology in a documentary format.

Since oil, natural gas and coal are primary energy sources for many human activities, the over-reaching question of response to peak oil involves many sub-questions, including the effects of resource depletion on transportation (both

personal and commercial), food production, energy generation, and the structure of the economy in general. An important element in adaptation to peak oil involves envisioning strategies for mitigating negative effects from fossil fuel depletion and climate change. Strategies of mitigation include evaluation of the potential benefits and costs of various alternative energy technologies, and a survey of proposals put forward by community organizations and municipal task forces to overcome these threats.

A basic assumption of this dissertation is that the magnitude of the challenges for energy use will entail widespread and deep social changes in the economic and political spheres. A general theme, based on existing theoretical studies, involves significant relocalization of social support activities like food production and energy generation. I examine how citizen activism may have a consciousness-raising effect on some civic officials and members of the public. But I also expect that the scope and expense of mitigation programs will elicit significant resistance from certain sectors of communities, based on powerful entrenched vested interests and social inertia, that will threaten to undermine the utilization and effectiveness of some of the initiatives discussed herein.

The perception of the urgency of the various challenges of peak oil is a crucial factor guiding the prioritization of community-based solutions. A central reason for studying local community activism is that there has been very little movement to engage these issues at the upper levels of the political structure in the United States. The only significant pro-active responses seem to be emerging

at the local level, as activist organizations engage city and county populations and governments to confront the threats. Since the Transition and Sustainability organizations under study here are pathfinding efforts, this dissertation will provide one of the first examinations of their strategies and tactics. We also offer some innovative observations of the psychological aspects of rapid cultural change.

An important goal of this study is to establish how Transition initiatives and Sustainability groups in northern California conceive of their vision and mission, by which strategies and tactics they pursue them, and how they have evolved during their early years of activity. The selection of specific communities was based on two pragmatic factors: the progress in their development of community activism around issues of sustainability and transition, and their familiarity and geographic proximity to the researcher. Furthermore, this project can only reveal a snapshot in time of its objects of study, and cannot hope to attain conclusive knowledge of their outcomes.

The particular groups examined are located in the northern California counties of Marin, Sonoma, and Mendocino, including the towns of Fairfax, Sebastopol, Cotati and Willits. The purpose of this dissertation is to describe the strategies devised to minimize the negative impacts of peak oil and climate change, and to build community resilience in terms of critical resources. Since the author has been an active participant in some of these groups, the method of this inquiry meets the definition of participative action research. The individual

participants in the study were glad to act as cooperative participants, since they recognized that the project would be supportive of their efforts, and would provide them with valuable perspective in their efforts.

Since Transition and Sustainability groups engage directly in political education and action, another important area of research involves finding practical general models for effective strategic and tactical organization by activist groups for social change. Transition plans are very context-dependent, since each community has to evolve its own path towards prioritizing the challenges and re-localizing the solutions. This study should be helpful in guiding other communities as they develop their own transition plans, on which future economic and political stability may well depend. This writer assumes that most American communities will be forced to confront these challenges very soon, and the vanguard efforts of the communities discussed here, as well as studies such as this one, will provide a foundation for the efforts of others.

CHAPTER TWO:

BACKGROUND AND CONTEXT OF PEAK OIL AND TRANSITION

THE POWER OF OIL

All life is driven by energy. Plant species produce their own energy from sunlight through photosynthesis, while animal species require external energy inputs from either plants or other animals. The human species has proven unique in the degree to which it has been able to employ technological means to derive energy from external sources. Beginning with the harnessing of fire for heat and animals for labor, humankind has managed to expand its exploitation of external energy sources, and in doing so to modify its environment beyond recognition. The cultural programmability of human beings through innovations such as language and writing has enabled the transmission of these discoveries from generation to generation (Price, 1995).

To grasp the historical significance of the power of oil, one must understand the place of energy and technology in the growth and structure of human society. Over the centuries, human society has come to rely on abundant and inexpensive energy to perform the labor required to support a burgeoning human population. Only two hundred years ago, the population of the world stood at one billion, and around 90 percent of humanity lived and worked on farms and traveled by horse, carriage or foot. In the mid-19th Century the introduction of coal as a replacement fuel for wood led to the expansion of train and ship travel and the expansion of industrial production. Electrical generation became widespread around the turn of the 20th Century, along with the adoption

of the automobile, fueled primarily by an even more powerful fuel—crude oil (Heinberg, 2005).

By 1930, the world population had reached two billion, with much of that growth occurring in urban instead of rural areas, and multiplied to six billion by the year 2000. During the age of fossil fuels, the average life expectancy in the industrial world has nearly doubled, amidst predictions for a worldwide population of nine billion by mid-century (Ryerson, 2010). This population explosion had been enabled in large part by cheap energy from fossil fuels, along with technologies designed to exploit them (Ryerson, 2010).

The vast highway network in the United States was a product of the post-war boom and encouraged the development of a suburban lifestyle (Silverthorn & Greene, 2004; Kunstler, 2005). Air travel became common during the 1950s and'60s. Today around 95 percent of U.S. transportation is fueled by oil, but oil is not only crucial to transportation. Per capita food production has multiplied at least five-fold worldwide since the introduction of mechanized farming, including widespread use of fossil fuel-based fertilizers and pesticides over the past half-century, often referred to as the *Green Revolution* (Heinberg, 2005). The second half of the 20th Century has witnessed an unprecedented global expansion of communications and trade, as evidenced by such phenomena as multinational corporations, satellite television and the Internet.

Today roughly 84 percent of all U.S. industrial and consumer energy comes from fossil fuels—oil (39 percent), natural gas (24 percent) and coal (21 percent)—with nuclear power providing most of the balance at 16 percent

(Hughes, 2011). Corporate agriculture depends heavily on oil and natural gas. Many of the materials and appliances that support modern life require oil for production, for example pharmaceuticals and plastics (Heinberg, 2005). As much oil goes into the production of an average automobile as that car consumes in the first few years of driving. Global climate change, due in significant part to human action in burning fossil fuels, is causing temperatures to rise worldwide—melting glaciers, disrupting patterns of agriculture and water supply, and putting in jeopardy the viability of coastal populations (Lovelock, 2006).

In a technological society such as the United States, every person has over 200 "energy slaves," meaning that each person's consumption of goods and services would require 200 people to produce if strictly human labor were used (Price, 1995). According to even the most generous projections, by the end of the current century the most powerful sources of this energy (fossil fuels) will be nearing exhaustion, and there is no *presently developed* combination of alternative fuel sources that might sufficiently replace them (Heinberg, 2009). Thus the stage may be set for a worldwide collapse of human civilization, with all the consequent starvation, disease, wars and social strife that would accompany such a collapse.

Although individual societies may rise and fall, the overall thrust of social organization in the past few centuries has been towards ever-greater complexity and higher technology (Laszlo, 1996). However, projecting these trends into the future may be problematical. First, there may be limits to the abundance and density of the energy fluxes that fuel the engines of society. There is another, more entropic way of looking at the evolution of humankind's search for energy:

that humans have been picking the low-hanging fruit, burning wood until deforestation became a problem; digging for coal and pumping oil until discovery became difficult and expensive, and their ubiquitous use endangered the environment; and now turning to nuclear energy—a capital-intensive, technologically complicated, and politically and environmentally dangerous way of producing energy (Price, 1995). Each new step in energy production has become more difficult, expensive and destructive.

However, this progress has been accompanied by harbingers of dangers to come. From ancient times, increasing population led to the expansion of agriculture, widespread deforestation, and the extinction of many large species from hunting (Tainter, 2003). Growing cities often choked on the pollution from their factories. The drift of populations from the countryside to the city created a poor, exploited and generally powerless underclass, increasing a social complexity that widened the separation between the rich and the poor (Sztompka, 1993; Tainter, 1988). By the 1970s some scientists began to question whether human resource consumption was approaching natural limits to growth (Meadows et al, 1972). At the dawn of a new millennium, warnings of global climate change and resource depletion appear to be on the brink of realization, posing ever greater threats to the prospects for economic, political and environmental sustainability, and putting the future of the human species in jeopardy (David et al, 2006; Heinberg, 2005; Lovelock, 2006).

Contemporary scholars have applied recent discoveries in ecology, systems theory, cybernetics and sub-atomic physics to the study of social ecology.

Catton (1982) and Hardin (1993) examine the relationship of food abundance to population growth and resource consumption. Laszlo (1996) and Goerner (1999*;* Goerner, Dyck & Langerroos, 2008) interpret theories of social change in the light of theoretical perspectives from quantum theory, systems theory, and chaos theory. The groundbreaking *Limits to Growth,* originally published in 1972 (Meadows, Meadows, Randers & Behrens, 1972) was updated in 2004 (Meadows, Randers & Meadows, 2004) to reassess ecological developments during the three decades since its original publication. While often derided by critics, many of whom misinterpreted and distorted its predictions, this book's basic thesis now appears to have been quite prescient (Smil, 2005).

Most conventional economic and political leaders assume the desirability of growth in economic activity and population. But ecological economists are currently attempting to integrate some of the opposing assumptions between ecology and traditional economics, by viewing human economies as a subset of their ecological support systems, requiring sustainability and stability (Hickerson, 2004; Daly, 2005; Korten, 2006; Eisler, 2007; McKibben, 2007). As Daly observes: "The global economy is now so large that society can no longer safely pretend it operates within a limitless ecosystem. Developing an economy that can be sustained within the finite biosphere requires new ways of thinking" (Daly, 2005, p. 100).

WHAT IS PEAK OIL?

Peak oil theorists assert, on the basis of evidence such as declining oil production in most oil exporting nations and declining discoveries of new oilfields worldwide, that the inevitable peak in global oil production will occur sooner rather than later, in the period from 2005 to 2020. They further posit that the peaking of world oil production will likely have devastating economic impacts because of the importance of petroleum to transportation, the lack of adequate substitutes, and the amount of time and investment required to produce substitutes to the required scale (Kunstler, 2005; Heinberg, 2005).

The theory of peak oil posits that the *rate* of extraction of natural resources (such as oil) reaches a peak and begins to decline as a result of increasing production costs long before the resource is exhausted. Peak-and-decline extraction profiles have been observed frequently (for example, with oil extraction in the United States, Mexico and the North Sea), so that the factors leading to peaking of production are by now fairly well understood (Campbell, 2001; Deffeyes, 2005; Heinberg, 2005).

The foundational framework for predicting oil depletion goes back to the mid-1950s, when Shell oil geologist M. King Hubbert predicted that oil production in the United States would peak around 1970, which is precisely what occurred. An important expression of this prediction was the so-called *Hubbert Curve,* a bell-shaped chart that tracked the rise, peaking and decline of oil discovery, and how production (extraction) tends to lag behind in a similar pattern (Campbell, 2001; Deffeyes, 2005; Heinberg, 2005). Although world production

failed to peak around the year 2000 as Hubbert had predicted, this error may well be due to conservation measures undertaken in the 1970s and early ’80s, during Arab oil boycott and the formation of OPEC. However, representatives of the Cambridge Energy Associates (CERA) believe that new oil discoveries and improved drilling technology will push back the peak of oil production until 2040 or 2050 (Cohen, 2007).

In the past decade, several senior oil geologists and energy investment experts published papers predicting the immanent peaking of oil production. They based their estimates on the declining rates of extraction of the world’s major oil fields, the decline in the rates of new discoveries, and the models of predicting decline developed by Hubbert (Campbell, 2001; Laherrere, 2001; Bentley, 2002). In 2000, retired energy geologist Colin Campbell founded the Association for the Study of Peak Oil and Gas (ASPO) (http://www.peakoil.net), which has hosted international conferences on peak oil in Europe and America for several years, publicizing the concept of peak oil and tracking the numbers on discovery, production and estimated reserves.

In 2004-2005, several books appeared exploring the economic and social implications of oil scarcity (Roberts, 2004; Deffeyes, 2005*;* Heinberg, 2005*;* Simmons, 2005*;* Kunstler, 2005). Written by journalists, academic scholars and energy investment consultants, these books examined the paramount significance of oil in the economies of the industrial world, citing not only its centrality to transportation, but also to global trade, agricultural output, the production of goods, and a variety of other systematically-linked economic activities.

Several recent documentary films (Silverthrorn & Greene, 2004; Gelpke & McCormack, 2006; Wood, 2006) publicized the threat of peak oil to the suburban automobile-based social structure of the United States, and included interviews with many of the authors mentioned above. These films developed one unified theme: in a world of oil scarcity, the economies and lifestyles of the world (and especially the United States) would face a crisis of unprecedented proportions, a crisis that could arrive sooner than most people anticipate, with powerful and systematic harmful effects.

In 2005 the United States government issued a report entitled *Peaking of World Oil Production: Impacts, Mitigation, & Risk Management* (Hirsch, Bexdek, & Wendling, 2005). Known as the Hirsch Report after its primary author Robert Hirsch, this under-publicized document was commissioned by the U.S. Department of Energy and produced by the non-ideological Washington D.C. think tank Atlantic Council. The report confirms the immanent likelihood of peak oil, outlines multiple scenarios of mitigation and their likely effectiveness, and warns that in the absence of an urgent mobilization two decades prior to the oil peak, the economic consequences could be unprecedented, leading to a shortfall in energy supply of as much as one-third of the projected demand, with a proportionately negative impact on economic growth.

Since 2005, the discussion about peak oil and its consequences has migrated to the Internet, where a number of authoritative web sites have emerged. In addition to ASPO, respected peak oil information sites include The Oil Drum (http://www.theoildrum.com) and the Energy Bulletin

(http://www.energybulletin.net). Many of the articles found on these sites are written by authoritative academic researchers and industry insiders. I have been a member of a Yahoo discussion group called SFBayOil (http://tech.dir.groups.yahoo.com/group/sfbayoil) for over five years, and many of this group's members are knowledgeable experts, including some members of San Francisco's Peak Oil Task Force, prominent academics, and respected professionals in various areas of energy analysis.

Given increasing demand from developing nations like China and India (Roberts, 2004; Hart, 2011), and resistance of many nations to serious participation in international strategies for limiting carbon emissions and oil consumption (Heinberg 2007a), many observers conclude that the point at which oil production will peak is fast approaching. Simmons (2005) believes that many OPEC members, particularly Saudi Arabia, have exaggerated their projected oil reserves for political and economic motives, and will prove unable to increase future supplies as projected (Simmons, 2005). OPEC's inability to significantly increase production during the 2008 price spike gives weight to these assertions.

There is no serious disagreement within the scientific community about *whether* oil production will peak; the main point of disagreement is *when*. Optimists, represented by the Cambridge Energy Research Associates (CERA), believe it could be three decades before oil production peaks, and yet another decade before serious economic consequences play out (Cohen, 2007). A significant point of disagreement is the sufficiency of alternative sources of energy to replace oil. Pessimists believe the optimists overstate the net energy to

be derived from unconventional oil sources, as well as their negative impacts on the environment. But even optimists recognize that, for practical purposes, the Age of Oil will end by mid-century, so complacency about the threat is certainly unwise. It is now an established statistical fact that conventional oil production has reached a plateau since 2005, and there are indications that production of all oil liquids may have peaked in 2008-2009 (Hart, 2011).

WHAT ABOUT ALTERNATIVE ENERGY?

What alternative sources of energy could compensate for the depletion of oil and natural gas? Nuclear power and hydropower aside, all of the non-fossil-fuel renewable energy sources currently being promoted or developed comprise less that two percent of the current U.S. energy supply (Hughes, 2011). Prospective alternatives to crude oil include unconventional oil sources, such as deep sea drilling, tar sands and oil shale; coal (hopefully with carbon sequestered to reduce greenhouse emissions); nuclear energy (fission currently, hopefully fusion later); biofuels like ethanol from corn, soy and sugar cane; solar and wind power; geothermal and tidal power; algae; hydrogen; and other more exotic or speculative sources like zero-point energy. Many economists simply assume that if oil and gas become more expensive, other sources of energy will become more competitive in the marketplace. However, many geologists and ecologists raise serious objections to this assumption (Heinberg, 2009).

In considering the potential of alternative energy sources, a crucial factor is the *EROEI* ratio—*energy return on energy invested*, or *net energy*. In the early days of the oil age (the late 19th and early 20th Centuries), the most accessible oil was extracted at a ratio of 100:1—one hundred units of energy returned for every one unit invested. The 21st Century environment requires more sophisticated exploration and more difficult and expensive methods of extraction, putting the current EROEI ratio for conventional oil between 17:1 and 10:1. Unfortunately, with most unconventional oil sources and ethanol, the ratio dips below 5:1. Indeed, some scientists assert that ethanol from corn requires more energy to

produce than it yields, making it a net energy loser (Heinberg, 2009). Virtually all alternatives require other forms of energy to produce, such as oil or gas, significantly reducing their prospects for net energy production. Some experts estimate that an EROEI of between 8:1 and 4:1 is required to maintain the structure of civilization that exists in the industrial world today (Tverberg, 2011). So although peak oil theorists value some alternatives and are skeptical of others, in general they believe that the prospect is dim that any combination of known safe, renewable and affordable alternatives will be sufficient to replace the energy currently generated by fossil fuels within the next decade or two (Heinberg, 2009).

To assume that these sources might replace even half of the 85 percent of U.S. total energy currently produced from fossil fuels, within a time span of a couple of decades, is to foresee a transition in technological infrastructure unprecedented in history. The EROEI ratio for most alternative fuels falls short of that of oil or gas by a factor of four times or more. Storage of energy generated from wind and solar presents major challenges. Burning more coal would further aggravate global warming and require expensive carbon extraction and sequestration processes that would create other pollution problems and increase costs. Nuclear power plants are expensive and time-consuming to build (and demolish), create dangerous waste products, and threaten to contribute to the proliferation of nuclear weapons. Biofuel from algae may be a promising biotechnological solution, but it is decades away from being scaled up to an adequate level of industrial production to replace a significant portion of energy

consumption from fossil fuels. It is thus hard to argue convincingly that there exists any combination of alternative energy sources that will forestall severe problems for civilization if oil and gas supplies peak in the near future (Heinberg, 2009).

IMPACTS

Peak oil poses an immediate challenge to the world's supply of energy, and thus to worldwide economic and political stability. Globalization of transportation, trade and communications has created a worldwide system of inter-connected economic, financial, cultural and environmental relationships. Peak oil theorists believe that humanity must face the possibility that when affordable oil and gas run low there may be no adequate alternatives, and the age of modernity as we have known it for generations will grind to a halt (Heinberg, 2005; Kunstler, 2005; Greer, 2008).

What are the most immediate and serious challenges to be faced with the coming of peak oil? The sector of the energy economy most dominated by oil is transportation, so this sector is the most vulnerable because there are fewer alternatives. All potential liquid alternatives—biofuels, liquefied coal, natural gas—would be too expensive and impossible to scale up quickly enough to match current demand; would entail extensive and costly reconfigurations of distribution networks; and would in most cases fall short of the efficiency of oil in terms of EROEI (Heinberg, 2009). Historically the U.S. has taken almost two decades to turn over its fleet of automobiles, and even longer for trucks and buses. So transforming the U.S. fleet into electric cars would likely be a generational project—a feasible task had it been undertaken twenty years ago, but not a practical plan if oil production is peaking today (Angelantoni, 2008). The present U.S. electric grid is in serious disrepair, requiring extensive renovation and expansion to be able to support the additional demands that a fleet of electric cars

would require (Lerch, 2010), fueled most likely by dubious sources like so-called clean coal or nuclear power, with their consequent economic and environmental costs.

Thus it is hard to envision a realistic scenario for the future that will include many Americans driving personal cars if oil prices rise dramatically within the next decade. Military and civic governmental institutions would likely claim most of the available fuel resources, leaving little gas to trickle down to consumers. A more likely future will involve more pedestrian and bicycle traffic combined with more public transit, and the rising costs of energy for construction will likely favor small flexible systems (buses and car sharing) over large capital-intensive mass transit projects (Heinberg, 2004; Kunstler, 2005; Greer, 2008).

Another segment of the energy economy even more essential than transportation may be imperiled by peak oil: food production. Growth of worldwide food production during the oil age has kept pace with population growth, or perhaps one should say that population has expanded with food production. Fertilizers and pesticides produced from oil and natural gas have played a large part in the Green Revolution that has multiplied agricultural productivity worldwide. With the decline of these chemical supports, per capita food production would be expected to plummet, leaving the world's billions facing the serious prospect of widespread starvation. Only a rapid reorientation towards relocalized, labor-intensive food production, along with new systems of food distribution and widespread changes in dietary expectations, would afford

the opportunity for millions to survive the collapse of industrial agriculture (Heinberg, 2004; Kunstler, 2005; Greer, 2008; Hopkins, 2008).

Any system of manufacturing that relies on worldwide markets or production networks will likely face major challenges to its survival. Businesses that require oil products in the production process will likely see their costs rise dramatically even as demand shrinks in a depressed economy. Oil-intensive transportation industries like airlines will probably not survive except for elites, unless they can transition to a replacement fuel within a very narrow time frame.

Disruptions of essential networks of transportation, food production, and economic activity would inevitably have dramatic impacts on the structure of society as a whole. Citing the short time frame for action, the inertia of public consciousness, the absence of sustainable alternative energy technologies, and the impossibility of sweeping land reform in a capitalist society, Kunstler (2005) believes that America's major cities are doomed to fall into chaos and anarchy, and that its suburbs will be rendered economically unviable. This vision leaves only the small towns—specifically those fed by sufficient water supply, in regions remaining sufficiently temperate for agriculture, and distant from large population centers—as the foundation for whatever civilization survives the combination of peak oil and global warming.

The United States, the world's greatest consumer of oil—roughly 25 percent of worldwide consumption (Heinberg, 2005)—seems particularly vulnerable to factors of collapse. The negligence of the American government in taking decisive action to promote conservation or control greenhouse gas

emissions establishes its policies as clearly dysfunctional, gambling with long-term catastrophe to avoid upsetting the status quo. Orlov (2008) reports his observations of the economic and social dysfunction within Russia during the collapse of the Soviet Union, and considers the prospects for the United States in a similar decline. He notes that Russia had some significant advantages over the U.S. in dealing with social collapse: citizens were guaranteed housing; many households already had garden plots providing small quantities of fruits and vegetables; and mass transit was the predominant mode of transportation. Americans lack such a supportive infrastructure (Orlov, 2008).

Heinberg (2007b) cites as harbingers of cultural descent a startling number of peaks, including not only oil and natural gas but also potable water, arable land, grain production, fish catch, uranium production, and a host of others. In this view, human population and consumption are putting unsustainable pressure on the ecosystem that supports it, and no technological fixes are likely to do more than slightly delay the inevitable reckoning.

In a worst case scenario, a permanent worldwide economic depression could ensue; wars may break out between nations and factions fighting over remaining fossil fuel resources; and a significant percentage of the world's population may not survive, nor will most of the complex structure of what we call civilization (Kunstler, 2005; Heinberg, 2005; Lovelock, 2007; Greer, 2008). Price (1995) views the exhaustion of fossil fuels as suggesting that the human species may have reached an evolutionary turning point. Reasoning from an evolutionary perspective, he conceives human civilization as arising from

mankind's utilization of energy and technology: "The extent of human energy use is a consequence of the human capacity for extrasomatic adaptation. This capacity makes it possible for human beings to adjust to a wide variety of novel circumstances without having to wait many generations for evolution to change their bodies" (Price, 1995, p. 304).

Peak oil theory implies certain linear and deterministic aspects. It identifies one element—the natural resource of oil—as the prime causative factor in the development of modern technological society, including such primary constituent characteristics as the expansion of transportation, agricultural production and population. Also, the Hubbert Curve conceives of the growth and decline of oil as a predictable cycle. Theories of linear causality and cyclic regularity are generally regarded with skepticism by both general theorists like Sztompka (1993) and specialists like Tainter (1988) and Diamond (2005). However, both Tainter and Diamond concede that if a natural resource is critical enough to a society, and its availability is reduced drastically and suddenly enough, then the loss of such a resource may be a sufficient condition for the decline of that society.

The specific scenarios for the impacts of fossil fuel depletion rest on a broader understanding of the causes and patterns of cultural development, the place of technology and energy within that development, and the circumstances that have historically undermined social stability and cohesion. Theories of social change often tend to be linear and historical in nature, but advance a vision of

social evolution informed by recent scientific developments such as systems theory and chaos theory (Laszlo, 1996; Goerner, 1999; Tainter, 1988).

In the 19th Century, many philosophers (such as Hegel and Marx) subscribed to an evolutionary or developmental model, which envisioned social change as a dialectical progression towards a higher end or state. Twentieth Century sociologists, for the most part, have departed from these linear models, inspired by the more complex visions of structuralism and systems theory. Mumford (1934) critically examined the influence of modern technologies (particularly transportation, and by implication oil) on the patterns of development of urban spaces. McLuhan (1964*)* focused on the influence of media on the social construction of reality, with much attention paid to the creation of a *global village* as a result of worldwide instantaneous electronic communications. Kuhn (1996) identified the priority of paradigms in the transmission of knowledge, and the process of integration of anomalous information into the intellectual fabric of society.

In the current era, Harris (2001) adapts Marxist materialism by grounding it in an ecological understanding of how energy production contributes to the complexity of social infrastructure. Diamond (1997) speculates on which elements of biological and technological development enabled some societies to attain dominance over others. He observes how surplus energy, in the form of animals for labor and beneficial crops, relieved the survival pressures on primitive peoples and freed their time for imaginative thought and invention, creating a positive feedback cycle that ultimately led to the development of such phenomena

as literacy and cultural production, enabling the continuity and progress of human society.

However, the very complexity that enables the advance of human civilization makes it more vulnerable to disequilibrium. Social growth may attain a plateau of stability, followed by over-complexity and an over-concentration of power that leads eventually to decline (Goerner, 1999; Tainter, 1988). Human population displays the same tendency of most species in the natural world, a propensity to overshoot when resources are abundant, until its growth is reversed by an exhaustion of those resources (Catton, 1982; Hardin, 1993).

Societies evolve through different stages of complexity by transitions from one structurally stable level to another. These stages involve the effective use of energy and resources, the managerial control of internal and external conflicts, the increasing specialization of skills and technology, and greater differentiation by class (the gap between rich and poor seeming to be a consequence of greater social complexity). As long as a complex social system is functioning optimally, food is abundant, and population and prosperity expand. However, any major jolt to the system's equilibrium can send a society careening towards *collapse*, a decrease in social complexity that is characterized by a decline in resources, population, and institutional and social order (Tainter, 1988).

Many great civilizations are known to have collapsed in the past, among them the Roman, the Mayan, the Kampuchean (Cambodian), and that of the Easter Islanders (Tainter, 1988; Diamond, 2005). The documented collapse of historical societies belies the notion of inevitable human progress, although the

expectation of overall progress towards greater complexity and higher technology is widely taken for granted. Scholars have attempted to reveal general principles that might explain the phenomenon of the collapse of complex societies. Diamond (2005) developed a five-point framework of factors that he believes precipitate collapse: a) Inadvertent infliction of damage by a people on their environment (a classic example being the deforestation of Easter Island civilization); b) Climate change (until the present day, an accident of nature beyond human control; today, a product of human energy consumption and pollution); c) Increasing hostility with neighbors; d) Decreased support from friendly neighbors; and e) Dysfunctional responses to crisis by a society's political, economic, and social institutions (Diamond, 2005).

Tainter's inventory of factors that contribute to societal collapse is intricate and extensively documented. Foremost among them is economic decline, which though often caused by resource depletion or conflicts with neighbors, may sometimes be a result of poor management of political and economic response to crisis. In other words, a society's dysfunctional response to challenges may magnify dislocations from resource depletion or climate change. Citing several empirical studies, Tainter (1988) demonstrates how complex systems reach a point of diminishing returns in terms of productivity, allocating more and more resources to less and less advantage, until the system becomes unsustainable.

Sztompka (1993) emphasizes the influence of human agency above deterministic developmental processes, but he also recognizes the influence of the

natural environment and traditional social structures on the process of societal transformation. Unfortunately, because the gradual effects of global warming and fossil fuel depletion span generations, human agents have difficulty altering their present and future expectations despite mounting probabilities of future calamity. Indeed, there is a striking similarity between Sztompka's graph of progressive deprivations that lead to social revolution, and a graph from the Hirsch Report on peak oil (2005) predicting the shortfall of the oil supply in relation to demand.

Taken together, the dire possibilities posed by peak oil paint a grim picture for the immediate future of the human enterprise. But the human species has survived ice ages and world wars, and retains a tremendous amount of knowledge and capacity for ingenuity. People will apply their best efforts to find solutions to these challenges, both in technological innovation and creative social restructuring, to create opportunity out of adversity (Homer-Dixon, 2006).

PSYCHOLOGY

How are people likely to respond to the challenges of peak oil? An important question that social and political leaders must address is how quickly individuals can adapt to extreme changes that call into question the cultural myths by which they define their identity and expectations. When one looks for answers to these questions in contemporary psychology or sociology, the prospects for rapid adaptive transformation appear to be outweighed by the natural inertia of individual and institutional cognition and behavior.

Grant (2007) cites several factors that complicate psychological adjustment to peak oil. The complex and hypothetical nature of the phenomenon makes it hard to explain. Peak oil has never occurred before, so there are no historical precedents; experts may disagree about when the peak will occur, and how effective energy alternatives may be in mitigating the harmful impacts; and adaptive measures need to be instituted well before those impacts are widely observed. The history of the past two centuries has conditioned people to take the benefits of a cheap energy society for granted, and to have faith that advances in technology will solve whatever problems may arise. It is simply too hard for people to imagine that cultural mainstays like automobiles, airplanes or electricity could ever go away, even though they have been part of human society for barely over a century.

Past predictions of oil shortages have proven either temporary or without foundation, so even when oil prices rise, the prevailing expectation is that a combination of new discoveries, political pressure and advanced technology will

save the day. President Jimmy Carter, the most insightful U.S. president in terms of energy policy, was defeated for re-election in part because voters did not want to listen to his pessimistic prescriptions for conservation and alternative energy. Efforts to raise taxes on gasoline or terminate supports for fossil fuel industries usually run afoul, respectively, of taxpayer rejection or powerful corporate lobbying.

Some similarities may be noted between people's response to a death in the family, or a diagnosis of terminal illness, and their response to extreme cultural change. Our responses to the loss of expectations for the present or dreams for the future may resemble Kübler-Ross's (1997) five-step process of grieving: denial, anger, bargaining, depression and acceptance. When people—even generally well-informed people—confront information about peak oil, they often go through a period of disbelief, followed by a process of blaming others—governments, oil companies, etc. Then they begin looking around for solutions, usually in the form of technological innovations and efficiency, which might allow life to proceed basically undisturbed. This stage of bargaining is followed by a period of depression when they realize that the prospects are dim that alternatives will prove sufficient. Finally, when they come to accept that fundamental changes in their way of life are almost inevitable, they find they can move forward in a search for adaptive behaviors that may actually feel quite calming and liberating.

One aspect of psychological response is that if future predictions are too dire, people tend to shut down, assume fatalistic attitudes, and not think creatively

about changing behavior. Hopkins (2006) stresses the importance of focusing on enabling constructive change, recognizing that no matter how grim the outlook, some responses are still more constructive and beneficial than others. Individuals and communities always have some measure of control over their direct environment. The motto of the peak oil movement, Hopkins insists, should be "turning crisis into opportunity," of living more fully in harmony with our environment.

Notable among leading peak oil observers, Hopkins (2006) includes a discussion of behavioral studies of addiction and the ways through which people resist changing harmful behavior patterns. If we are indeed addicted to oil, as even President George W. Bush maintained in his 2006 State of the Union Address, any ambitious planning (economic, social or political) for changing the behaviors of consumption of millions of people requires a serious analysis of why people resist change, even when their behavior threatens their own long-term welfare and survival.

POWERDOWN

What strategies may communities and governments employ to effectively adapt to the challenges of peak oil? Heinberg (2004) outlines four potential strategies for dealing with severe energy shortages: *Last One Standing, Waiting for the Magic Elixir, Building* Lifeboats and *Powerdown*. Last One Standing is the path of conflict—accelerating economic, diplomatic, and ultimately military stratagems to control the world's remaining energy resources at the expense of other competing nations. This strategy would likely consume disproportionate amounts of the remaining fuels, sabotage efforts to reach international agreements, and serve to plunge the world ever more rapidly into economic chaos and political anarchy.

Optimists believe that humankind will solve the problem of peak oil through technological innovation, as it has solved other challenges throughout the past two centuries. Heinberg calls this strategy Waiting for the Magic Elixir; he believes that even if alternative energy sources could be scaled up at an unprecedented rate, they would still fall short of replacing the energy potentially lost from oil depletion (Heinberg, 2009). Focusing only on energy *supply* avoids coming to terms with the problems of rising *demand.*

Heinberg's third scenario, Building Lifeboats*,* is essentially a survivalist path, based on the assumption of the complete collapse of the broader culture (also known as the *Mad Max* scenario, after the Mel Gibson film character), and focusing on community resilience and the preservation of knowledge for future generations. The quality of life would become even more basic, resembling the

feudalism of the dark ages, lacking most of the benefits of networks of power generation, communication and economic organization.

Heinberg's preferred scenario, Powerdown—referred to by Holmgren (2009) as *Energy-Descent*—requires a proactive, coordinated and collective effort based on a few basic principles, including the need to limit population; to increase conservation and energy efficiency; to cap resource usage; to forego economic growth; to reduce disparities in wealth; and to re-structure and relocalize communities. This vision requires urgent change at *every* level of social activity and governance – community, corporation, municipality, state, nation and world. This approach would require a significant reduction in the standard of living of wealthy countries, and a wholesale re-structuring of worldwide economic and political organization, but might ultimately avoid the most dangerous consequences of wars, famines and plagues (Heinberg, 2004).

Heinberg cites three examples of existing contemporary societies that approach the Powerdown ideal. The most relevant is post-Soviet Cuba, which—as portrayed in the film *The Power of Community* (Morgan, 2005)—transformed itself in a decade from the most oil-dependent economy in Latin America to the most energy-independent and sustainable. Cuba had the advantage of a centrally planned economy, although the process of the "greening" Cuba has led to greater decentralization and relocalization. Other models for Powerdown include the Indian state of Kerala and American Amish communities (Heinberg, 2004).

Recently scholars have turned from arguing the case for peak oil to searching for strategies of mitigation—combinations of conservation, alternative

technologies and reorganization of social systems that might avoid the worst consequences of oil depletion. Some seek technological solutions, focusing on efficiency in energy generation and consumption (Hawken, Lovins & Lovins, 1999; Pahl, 2007). Hawken (2007) documents the rise of a decentralized worldwide network of thousands of citizen organizations that challenge the power structure by valuing the environment and indigenous cultures. Homer-Dixon (2006) considers the psychological and creative aspects of living in a time of crisis and chaos. Roseland (2005) and Low, Gleeson, Green & Radovic (2005) focus on infrastructure considerations such as pedestrian-friendly urban design and green building techniques. The principles of permaculture (Mollison, 1994) figure prominently in strategies to relocalize agriculture and provide food security. All of these authors make important contributions to the discussion of how systems of both intellectual analysis and social organization are changing in response to the looming crises of energy and ecology.

Alternative methods of producing electricity have been developing over the past few decades, among them solar, wind, geothermal, tidal, nuclear, and coal with carbon sequestration. While each of them poses different problems of scale, storage, transmission and safety, collectively they will make a significant contribution to the replacement of fossil fuels and the pursuit of a sustainable energy economy. The unanswered question is whether they will be able to be scaled up at a pace sufficient to provide enough clean energy before the decline in fossil fuels and the spread of climate change overwhelm current systems,

especially for the most immediate areas of need like transportation (Heinberg, 2009).

Other strategies for oil substitution are emerging from the sciences of bioengineering or subatomic physics. For example, researchers are searching for methods of synthesizing energy resources in the lab instead of seeking for them under the ground—in essence, growing oil (primarily from algae) instead of extracting it from the earth (Singer, 2007). Debate also rages over whether hydrogen will become a source of power for transportation or electrical generation; some recent research seems promising (Genesys, 2011). But scaling up these experimental technologies to meet the shortfall from oil in the near term appears to be an insurmountable challenge (Heinberg, 2009).

One of the most hopeful signs comes in the area of electronic communications. The Internet affords several advantages in the present historical moment: relative economy of energy consumption, reduction of needs for transportation, and a basis for improved democratic interaction in both local and wider communities (Gore, 2007). However, one cannot overlook the fact that the Internet is dependent on computer technology and worldwide wired and wireless networks, all of which may become vulnerable in an environment of severe economic contraction, rare earth minerals, and the decline of centralized political and economic power. Should such misfortune ensue, much of the knowledge of our era stored primarily in digital form may be lost to future generations. Because of this, archiving of knowledge should be an important priority of forward-thinking social planners (Heinberg, 2004).

The past few years have witnessed the rapid growth of public and non-profit initiatives to study the possible impacts of peak oil and seek strategies for mitigation of its harmful effects. The Post Carbon Institute (http://www.postcarbon.org) and Community Solutions (http://www.communitysolution.org) are prominent research organizations engaged in public education and networking in search of constructive responses to peak oil. The Post Carbon Institute has published *Post Carbon Cities* (Lerch, 2007), a how-to handbook for cities attempting to transition to a post-oil environment which recognizes that every city and region is unique in the context of its ecology and energy use; and the *Post Carbon Reader* (Heinberg and Lerch, 2010), covering a dozen different aspects of the challenges from peak oil.

TRANSITION

What approaches are community-based transition organizations employing to promote an effective response to peak oil? In the past few years, many municipal governments in the USA have begun to acknowledge the dangers of peak oil and climate change, and to investigate local strategies for confronting them by creating "peak oil task forces." Such groups assume the responsibility of assessing a community's level of vulnerability or resilience in relation to issues of sustainability in food security, energy generation, transportation, land use, business economics and social services. The first large city to undertake such a study was Portland, Oregon; its Peak Oil Task Force Report was completed in January 2007 (Portland, 2007). San Francisco recently published the results of its own task force in 2009 (San Francisco, 2009). Oakland, California, and Seattle, Washington, have also created peak oil task forces, which are expected to issue reports within a year of this writing.

These "beta test" towns serve as models for other communities to become aware of the dangers posed to local populations by oil depletion. Such plans will vary according to the specific strengths and deficiencies of municipal organization, bioregion ecology, economic base, population distribution, and other variables. But the hope is that the approaches that arise in small towns and cities will inspire leaders at the state and national level to acknowledge the problem and embrace the quest for solutions. There is reason to believe that the decentralist approach to addressing the threat of peak oil in a community-by-community fashion may be the best way to begin—although as Heinberg reminds

us, changes must occur at all levels of government and diplomacy for a comprehensive solution to the challenges of peak oil to be found (Heinberg, 2007a).

California has often been in the vanguard of social change in America, as it has been for years in confronting issues of global warming and climate change. Since 2000 activists in many northern California towns have established Sustainability groups in response to concerns over climate change, including San Rafael, Fairfax, Novato, and Mill Valley. Some groups have focused mainly on promoting policy change at the city or country level, while others engaged in practical community networking in areas like local food production and bicycle transportation.

The first sustainability activist group to be created was Sustainable Fairfax, founded in 1999 (www.sustainablefairfax.org). Sustainable San Rafael (www.sustainablesanrafael.org) and Novato (www.sustainablenovato.org) were created during the first five years of the past decade, and Sustainable Marin (www.sustainablemarin.org) came into being as an umbrella group to coordinate the activities of the various municipal groups. The focus of these groups varied according to the focus of their founders. Sustainable San Rafael focused primarily on influencing local government on policy issues, including the creation of a Climate Change Plan for the city (http://www.cityofsanrafael.org/Assets/CDD/Climate+Change+Action+Plan.pdf), while Sustainable Fairfax concentrated more on public education events and

initiatives—for example, films, speakers and demonstrations (http://www.sustainablefairfax.org).

The most direct predecessor to the Transition Movement in an American community emerged in the northern California town of Willits in 2004, when Jason Bradford founded the Willits Economic Localization Project, or WELL (http://www.transitiontownsca.org/group/WELL). This group began to raise consciousness of peak oil among local government officials, business leaders and residents, persuading the town to establish a peak oil task force. Soon thereafter, California towns such as San Francisco, Sebastopol and Oakland followed suit by commencing their own peak oil task forces, as well as other towns outside California such as Portland, Oregon; Bloomington, Indiana; and Hamilton, Ontario (Canada).

In 2007 the Post Carbon Institute (http://www.postcarbon.org) was founded as a study group to publicize the prospects for peak oil and investigate adaptive approaches. Led by Julian Darley, Celine Rich and Richard Heinberg, among others, Post Carbon created an online Relocalization Network to promote the creation of activist groups in local communities. In San Rafael in spring of 2008, Andre Angelantoni, Jonathan Frieman and I founded Post Carbon Marin to promote consciousness of the threats of peak oil in Marin County, California. Throughout that year our group made presentations to municipal government and civic leaders, as well as concerned citizens.

Fortunately for Marin residents, an excellent study of Marin County's prospects for ecological sustainability had already been produced, a Masters

thesis by Sonoma State graduate Colin Spake entitled *Analysis of Oil and Gas Dependence in Marin County, CA* (Spake, 2006). This thesis gave Post Carbon Marin an excellent head start in assessing the region's potential for sustainability. Also, Marin city and county governments have been in the forefront of environmental policy innovation, with initiatives such as Marin Clean Energy (http://www.marincleanenergy.info), Sonoma-Marin Area Rail Transit (http://sonomamarintrain.org), and the San Rafael Climate Change Action Plan (http://www.cityofsanrafael.org/Assets/CDD/Climate+Change+Action+Plan.pdf).

In the British Isles, community peak oil responses have assumed the moniker of *Transition Towns*—communities responding to the challenge of peak oil and climate change by building local resilience through conservation, relocalization of food and energy production, and the creation of local currencies. The Transition Culture web site (http://www.transitionculture.org) offers a blueprint for cities transitioning to a post-peak oil future. The tasks of a Transition group are to define its mission in terms of community and municipal education and activism, to set strategic priorities and goals, and to adopt tactics that will help realize those goals. Founder Rob Hopkins initiated creation of the Kinsale Energy Descent Action Plan in 2005 in Ireland (http://transitionculture.org/wpcontent/uploads/KinsaleEnergyDescentActionPlan.pdf), then moved on to create Transition Town Totnes in southern England in 2007 (http://transitiontowntotnes.org). In *The Transition Handbook* (Hopkins, 2008), his classic introduction of the Transition Town concept, Hopkins offers a

head-heart-hands model for change, recognizing the importance of intellectual, emotional and practical components in fostering social change.

The Transition model offers a series of principles for founding Transition Town groups. They include building a small steering committee of leaders; interaction with established community groups and stakeholders to establish cooperative networks; organizing high profile events and visible on-the-ground achievements to establish credibility; forming working groups around special topics like transportation, food, and energy; holding *open space* community meetings to promote citizen involvement in identifying and solving problems; facilitate renewal of important skills that have been lost; and honoring the knowledge of elders who remember what life was like in earlier times.

Transition Initiatives often utilize an *emergency planning* model to map out strategies for securing local sources of water, food, and power, in case traditional supply networks fail. Rooftop and community gardens and permaculture practices play important roles in the planning for food production in urban communities. Some of these strategies hearken back to simpler times when small towns were the heart of the nation, but they also look to new technologies like solar and wind power to afford new avenues for providing for the necessities of life. Current technical advancements, for example in solar panel technology, offer the promise that local and home-based solar energy generation may become more competitive with fossil-fuel-generated energy sooner than expected, both in terms of price and ubiquity.

In 2009 Jennifer (Raven) Gray, who had worked with Hopkins in England, moved to Marin County and began to promote the Transition Movement in Northern California. The Post Carbon Institute quickly established a partnership with the Transition movement by folding its activist Relocalization Network into the new Transition US, while assuming the role of an academic-style research institute. Since the founding of Transition US (http://www.transitionus.org), the movement has gone viral nationally, with scores of Transition Town initiatives founded across the country over the past three years. The first California town to be recognized as an official Transition Town was Sebastopol (http://www.transitionsebastopol.org), current home of the Post Carbon Institute; other Transition Towns developed in the North Bay area include Transition Cotati (http://www.transitioncotati.org), Transition Mill Valley (http://transitionmv.wordpress.com), and Transition West Marin (http://www.transitionwestmarin.org).

Since the Transition Movement's mission falls within the general category of political activism, literature on the strategies and practical methods of community organizing is relevant for our purposes. Kretzmann and McKnight (1993) outline a strategy for uncovering and developing the potential of institutions, organizations and individuals in the interest of social change. Their premise is that the most effective way to achieve success in community organizing is to take an inventory of the existing community networks—churches, schools, civic organizations and significant individuals—and network through

them to achieve one's specific objectives. This approach is very much in line with the Transition strategy of community networking.

CHAPTER THREE:

THE DOCUMENTARY VIDEO

PHILOSOPHICAL AND METHODOLOGICAL CONSIDERATIONS

This documentary video dissertation is a participative action research (AR) project. As a video producer, I documented the worldview and activities of peak oil and Sustainability/Transition activists with whom I have been associated. This project may be described as participative, collaborative, exploratory, illuminative, and transformative. It examines an emerging empirical activity (activism of Sustainability and Transition groups) in a relatively new area of research (community response to peak oil and climate change). It deals with community activism on issues and activities that are, by and large, new to the political arena and public sphere, following the progress of a movement and organizations that have been initiated very recently.

The origins of Action Research may be found in educational and organizational communications (Sagor, 1992; Coghlan, 2005; McNiff, Lomax & Whitehead, 2003), but in recent decades this approach has been applied more generally to a wide variety of topics in the realm of social action (Reason & Bradbury, 2001b). The approach has been firmly acknowledged as a legitimate qualitative research method for over two decades (Creswell, 2007; Patton, 2002; Reason & Bradbury, 2001a).

The basic dimensions of action research include: a) a participatory, democratic worldview; b) the development of practical, pragmatic knowing; c) the pursuit of social welfare; and d) direct involvement of the researcher in the

activity of study (Reason & Bradbury, 2001a). Participative action research seems an appropriate designation for our basic research modality, because: a) Transition initiatives engage in a grassroots, democratic process; b) they are focused on practical solutions to problems; c) they are working to create and implement strategies for social action to protect people from harmful consequences; and d) this researcher is directly and actively involved with their efforts.

Hall (2001) defines participatory research as "an integrated three-pronged process of social investigation, education, and action designed to support those with less power in their organizational or community settings" (Hall, 2001, 171). There are several principles that guide participatory action research, among them a) concern for powerless groups; b) active participation of the community; c) analyzing a problem emerging from the community in the context of the community; d) fostering a more authentic analysis of social reality; e) transforming the structure of the community and the lives of its members; f) creation in community members of a greater awareness of their own resources and their ability to mobilize for self-reliance; and g) participation of the researcher in the process of action and learning (Hall, 2001; Heron, 1996; Heron & Reason, 2001). These criteria match exactly the purposes of this current research project.

Action research sometimes attempts to frame scientific research in a human context (Reason & Bradbury, 2001a; Park, 2001). Scientific studies of oil depletion and climate change are generally positivist in nature, following well-founded scientific methods of analysis. Such studies are rigorously objective,

while recognizing that gaps exist in the current state of knowledge that may lead to differing estimates on the scale and immediacy of these problems. Projections of the impacts of these phenomena on cultural change rest upon a generally objectivist worldview, but rely on theories of social change, economics and political science wherein the concepts of cultural materialism and social constructivism may be invoked.

The philosophical perspective of this current research could be categorized as *cultural materialism* (Harris, 2001), a social scientific perspective with much affinity for action research. This orientation is ontologically objectivist but epistemologically subjectivist. That is, we believe that social constructions are the product of objective relations between human beings and their material world, but that culturally transmitted values and concepts—interpretive structures (such as economic, political or religious beliefs and institutions)—may over time assume an apparent reality of their own through cultural reproduction as they become foundational for the worldviews and expectations of successive generations. However, belief systems are not static, but rather are capable of adapting to changing material and cultural circumstances.

In epistemological terms, truth is not a static, objective configuration, but a dynamic field that includes both observed and observer. Action research embraces an expansive view of rationality, which acknowledges emotional feelings and moral beliefs as essential components of knowledge. Human beings do not learn primarily by passively observing but by acting, probing and responding (Park, 2001).

Critical theory bears a close relationship to action research, especially the genre of AR known as *community action research*, since structures of power and domination play an important part in the construction of political, economic and social realities (Creswell, 2007; Kemmis, 2001). The ability to mobilize social action is dependent upon the ability of activists to raise awareness of social networks, structures and hierarchies. Especially when confronting ecological threats that are both wide and deep, recognizing the relationship between the personal and political is essential. Corporate media occupy an important place in the hierarchy of social control (Park, 2001), and thus alternative media productions—such as the documentary involved in this dissertation—may make valuable contributions to the raising of consciousness.

The conjunction of systems theory and critical theory has implications for the analysis of the social construction of reality and the relationship between knowledge and power (Flood, 2001). The role of participatory action research, according to Gaventa and Cornwall (2001), is to empower people through the construction of their own knowledge. Questions may be raised as to what extent economic and political structures exist in the objective world, or to what extent they are the product of cultural preparation. Of particular relevance to the Transition Movement is *structuration theory* (Bradbury, 2001), which posits that social changes at the micro level of society can have important impacts at the macro level.

As an engaged activist, this researcher shares both the worldview and the values of the Transition movement. As a videographer, I served simultaneously

as both observer of and collaborator in the activities of the groups with which I interact. Some participative action research projects have conceived of the academic researcher as a facilitator of the action strategy of the organization being studied. This facilitator may help mediate inner and outer work, clarify theoretic maps, stimulate energy for new directions, expand links to resources, establish common ground with community organizations, and identify and emphasize transformative moments (Wadsworth, 2001).

Many models of action research demonstrate a cyclical process of exploring strategies of action, reflecting on the results, and adjusting action strategies based on those results (Sagor, 1992; Senge & Scharmer, 2001, Coghlan & Brannick, 2005). Indeed, this pattern of action research seems almost indigenous to the Transition movement itself; in a fundamental sense, participants within the Transition movement are doing action research already. They regard social systems from a certain theoretical viewpoint; develop strategies for social activism based on these theories; test a variety of approaches to community activism; and evaluate the success of their initiatives and modify them accordingly.

Community action research projects may be designed as intra-organizational, inter-organizational, or organization-transcending networks (Senge & Scharmer, 2001). Transition leaders conceive of their initiatives primarily as catalysts for creating inter-organizational networks, bringing together already existing, ecologically oriented groups into horizontally integrated partnerships in order to maximize their effectiveness and broaden their impact

(Chisholm, 2001). To the extent to which these organizations collectively produce broad social change, the initiative might be defined as *organization-transcending.*

Senge (2001) considers organizations that emphasize non-hierarchical collaboration intended to foster pragmatic social change to be *learning communities* – networks of organizations specifically designed *not* to remain static, but to evolve and deepen in both theoretical and pragmatic understanding. He identifies three important domains of activity in such groups: a disciplined approach to research and discovery; the building of both individual and collective capacity for action; and an emphasis on practical outcomes.

Chisholm (2001) outlines some of the practical processes involved in building an organization, such as selecting the right people for a steering committee, visiting the sites of other organizations, and holding regular conferences of related organizations. These inter-organizational relationships usually involve face-to-face contacts, referred to as *second-person* research (Reason and Bradbury, 2001a), between various stakeholders from the municipal, commercial and citizen-activist communities. The general mission of Transition Town initiatives might be described as *mutual consciousness-raising*, since the interests of all stakeholders merit respect. Activists deepen their understanding of the political-economic-social context of the community, even as they attempt to spread awareness of the potential threats from peak oil and climate change.

A crucial element built into the design of Transition activities is the *inner/outer* focus. Hopkins (2008) emphasizes the importance of internalizing as

well as externalizing change; Transition groups are taught to allow space and time for inner processing and reflection, to avoid an over-focus on action in the world, and to encourage Transition participants to use their intuitive faculties as well as their analytical ones.

In this current research project, the method of data collection was audiovisual recording. Decades of precedent exist for employing video recording in the service of social science research. The design of the interview questions (see *Questions for Video Interviews* in Appendix A), as well as the documenting of group interactions and activities, attempted to explore and clarify these foregoing issues, posing questions such as: How do Transition leaders diagnose the problems posed by peak oil and climate change in their various levels of complexity? How do they prioritize and execute action plans and evaluate their outcomes? How do they go about integrating existing groups into a coherent network? How may Transition groups address psychological resistance to issues of both head and heart? What is the relationship between citizen activism and the formulation of public policy? These are among the fundamental questions to be addressed by this video production, which will then serve its purpose as one more element in the ongoing development of Transition strategies and tactics.

Interview subjects ranged from theoretical pathfinders to group leaders to elected public officials. In-depth video interviews were employed to help establish the belief systems from which this movement emerges, and the processes through which strategic action is formulated, actualized and evaluated (Gaskell, 2000). The participative action research nature of this project

distinguishes it from other styles of documentary that adopt a theory of neutral observation. The collaborative approach to interviewing helps build trust with interviewees and encourage openness, and finds precedent in the work of Bradbury (2001) and Coffman (2009). Bracketing one's prejudices and developing non-attachment to the data are important techniques in maintaining a degree of objectivity during the production process. Finding a balance between action and reflection can ensure that neither is neglected. Generalizability is not usually considered a high priority for action research (Hopkins, 2008), since every Transition group is intensely context-dependent, and no formula exists for creating a Transition initiative beyond the set of general guidelines. Viewers of this documentary may form their own judgment as to what extent the activities of the groups studied here may provide lessons for their own communities.

To be considered successful, Transition Town initiatives must demonstrate concrete progress, in terms of pragmatic outcomes towards the realization of their goals. While the measure of ultimate success or failure may be measured in years, and thus extend beyond the reach of this current study, some benchmarks of notable accomplishment must be reached in order to consider Transition Town movements to be progressing in fulfilling their purpose.

PREPRODUCTION

The central component of this dissertation is a video documentary on peak oil and Transition, including footage of interviews with leading thinkers and group leaders. This documentary video may serve to raise a broader awareness of the activities of Transition groups, while at the same time offering participants in the Transition movement an opportunity for self-reflection.

To seek guidance in the general process of producing a documentary, I consulted some general books on the process of documentary production, most notably Jolliffe and Zinnes (2006) and Hewitt and Vazquez (2010). These texts helped me to gain an overall framework on how to proceed, in terms of research, production planning, approaches to interviewing, and the need for supporting video.

One method of film/video research involved surveying recent documentary films concerning energy and climate change, in order to gain a sense of how other filmmakers had approached the topic. I viewed several documentary films on similar energy-related topics in order to study both their structure and content. These films included *The End of Suburbia* (Silverthorn & Greene, 2004*), An Inconvenient Truth* (David et al, 2006)*, A Crude Awakening* (Gelpke & McCormack, 2006*), The Power of Community* (Morgan, 2006*), Mega Disasters: Oil Apocalypse* (Kent, 2007)*, Crude Impact* (Wood, 2006), and *What a Way to Go: Life at the end of empire* (Erickson & Bennett, 2009). Many of these films share similar structural aspects. The fundamental form includes interviews with experts (identified by subtitles), complemented by *B-roll* or *cutaway* shots (live

action, stock footage and still images) that reinforce the content of the interviews. Some documentaries rely exclusive on original footage, while others utilize auxiliary footage from other sources. The length of these films varied from around 50 minutes to over 90 minutes.

I have been doing background research on peal oil and mitigation strategies since before I entered the TSD program at CIIS in Fall 2006. However, the field of study is developing so rapidly that many of my important sources did not exist when I began my Ph.D studies, so I have made an effort to keep up to date throughout the process. From 2007-2008 I served as a staff volunteer at the Community Center of Sustainable Fairfax, and have been an active member of Sustainable San Rafael for several years. These associations have allowed me to make contacts and friendships among a core group of people promoting sustainability in Marin County. In October 2008 I attended the annual conference of ASPO-USA, the Association for the Study of Peak Oil-USA (http://aspo-usa.com) in Sacramento, California, where I began an ongoing association with Richard Heinberg and Daniel Stern of the Post Carbon Institute, which had just relocated to Sebastopol, California.

Some of the Sustainability groups that I examined were established prior to the beginning of my research, such as Sustainable Fairfax around 2000 and WELL in Willits in 2005. U.S. groups specifically designated as Transition Towns have been established within the period 2008-2010. Thus some groups can demonstrate more concrete achievements than others that are still in the formative stages. Some footage used in this program was shot in 2008-09 for

Post Carbon Marin, but videotaping directly for this dissertation project took place during the spring and summer of 2010.

I selected subjects to interview based on my familiarity with their research and activism with regards to the topics covered. Those whose interview segments are included in the video include (in alphabetical order):

1. Andre Angelantoni: Is a co-founder (with Jonathan Frieman and myself) of *Post Carbon Marin* (2008), and founder of *Post Peak Living* (http://www.postpeakliving.com), an educational website with online courses on peak oil and adaptation.

2. Jason Bradford: Is the founder of Willets Economic Localization Project or WELL (http://www.transitiontownsca.org/group/WELL), an activist community organization promoting adaptation to peak oil in Willets, and precursor to the Transition Town model.

3. Greg Brockbank: Is a San Rafael City Council member who attended an educational luncheon sponsored by Post Carbon Marin (2008).

4. Anita Fieldman: Is a community activist and former Director of the Marin chapter of the Progressive Democrats of America (until 2010).

5. Jennifer Gray: Is an early collaborator with Rob Hopkins in founding Transition Towns in southern England, and co-founder (in 2009) of TransitionUS (http://www.transitionus.org).

6. Pam Hartwell-Herrero: Is the Executive Director of Sustainable Fairfax (http://www.sustainablefairfax.org), and a recently elected member (in 2010) of the Fairfax City Council.

7. Richard Heinberg: Is a Research Fellow of the Post Carbon Institute, and author of several books on peak oil topics, including *The Party's Over* (2004)*, Powerdown* (2006), *Peak Everything* (2009) and co-editor of *The Post Carbon Reader* (Heinberg and Lerch, 2010). He is also a former lecturer in the Sustainable Communities program at New College and Dominican University.

8. Daniel Lerch: Is a Research Fellow of the Post Carbon Institute, author of *Post Carbon Cities* (Lerch, 2008), and co-editor of *The Post Carbon Reader* (Heinberg and Lerch, 2010).

9. Charles McGlashan: Recently deceased (in 2011), he was a member of Marin County Board of Supervisors who invited Post Carbon Marin to make a presentation to the Marin Board of Supervisors in 2008. He was a tireless advocate for government support for sustainability initiatives like SMART and Marin Clean Energy, and I have dedicated this video documentary to his memory.

10. Scott McKeown: Is the founder (in 2008) of Transition Sebastopol (http://www.transitionsebastopol.org) and a training facilitator for TransitionUS.

11. Judith Newton: is the founder (in 2008) of Transition Cotati (http://www.transitioncotati.org).

12. Carolyne Stayton: Is the Executive Director of TransitionUS (http://www.transitionUS.org).

13. John Stayton: Is a Professor and former Program Director in Dominican University's Green MBA program (http://www.greenmba.com).

There were others whom I attempted to interview without success, or interviewed but did not include interview segments within the video. They include Alice Friedemann, freelance journalist on energy issues; Jonathan Frieman, Marin political activist and co-founder of Post Carbon Marin; Kiki LaPorta, former Director of Sustainable Marin and co-Director of Sustainable San Rafael; Penny Livingston, co-founder of the Regenerative Design Institute in Bolinas, CA; and Bernie Stefan, co-founder of Transition West Marin.

Prior to conducting interviews, I compiled a list of questions designed to cover various aspects of peak oil and mitigation strategies (see Appendix A, Questions for Video Interviews). In scripting my approach to the video production, there are certain objectives I hoped to achieve. I wanted to reveal the worldviews and depth of knowledge of the participants in terms of their basic understanding of peak oil and climate change and their potential impacts on our economy and lifestyles; the psychological aspects of adapting to rapid change; and the strategies and tactics of social activism to educate the public and mitigate the negative impacts. One goal was to establish the socio-historical context for Transition activities through visual means, including archival and contemporary footage. I hoped to be able to discover how leaders and participants measure their expectations, successes and failures, and how they adjust their goals and priorities as their learning deepens.

PRODUCTION

After acceptance of my dissertation proposal, I proceeded to conduct and record my interviews. Everyone who appears in this documentary signed a release for photographic representation (see Appendix B, Video Release). I also began to engage in film/video research for my documentary, seeking both archival and contemporary footage that could be used to visually reinforce the content of the interviews. This process began before the interviews took place, since I had good ideas of what to expect my subjects to discuss; and it continued after the interviews were complete and the editing process had begun, since I found myself seeking additional shots to visually support what the subjects actually said. For background video (referred to in the journalistic world as *B-roll* or *cutaway* shots), I acquired archival/historical footage and shot original contemporary footage subsequent to the taping of interviews during spring/summer 2010.

Beyond the interviews, I had hoped to shoot footage of training workshops and committee planning meetings of Sustainability and Transition groups. Unfortunately, this coverage proved difficult, since group leaders and participants feared that the presence of cameras would undermine the spontaneity and/or confidentiality of the proceedings. So I only have a little video footage (without sound) and still shots of some of these sessions, and these activities therefore had to be described after-the-fact through interviews. I have also used portions of previously videotaped material—for example, public presentations of Post Carbon Marin—that I shot myself, and for which I obtained video releases from

participants. Some of the B-roll or cutaway footage for this current documentary was shot by myself, and some consists of stock footage from other films.

I attempted to contact the producers of all of the documentaries from which I employed footage. In some cases I received permission to use footage, but in other cases I received no response. The use of footage shot by others without permission and/or payment raises questions concerning copyright law. With a production intended for profit or public distribution, copyright law generally prohibits use of such material without explicit permission (and compensation if requested). For academic projects produced within a course context and intended primarily for viewing in academic environments or library archiving, fair use exceptions to copyright law apply. In general, fair use exceptions apply to the use of copyrighted material produced in an academic context where the use a) has a non-profit educational purpose; b) is transformative in relation to the original; c) represents a small percentage of the original (under 10 percent); d) has a minimal effect on the market value of the original; and e) is derived from a legally obtained copy of the original (Brown, 2010; Columbia, 2011; Crews, 2000; Howell, 1999; Stanford University Libraries, 2002; UMUC, 2011; The University of Texas System, 2011). I believe that all these fair use exceptions apply to my video. For my production, cutaway footage was obtained from some of the films listed previously: *A Crude Awakening* (Gelpke and McCormack, 2006)*, Mega Disasters: Oil Apocalypse* (Kent, 2007); *Collapse: Based on the book by Jared Diamond* (Dockstader, 2010); *Hidden Bounty of Marin* (Quirt and Rilla, 2009), used with permission; and still images from stock

footage web sites and sites related to the Sustainability and Transition organizations discussed in the video (used with permission). Still images derived from stock footage web sites were indicated to be in the public domain and therefore free of copyright restriction. All of these sources are acknowledged in the end credits of the video.

Another variety of video research involved archival footage that would be useful in establishing the historical context for my documentary. The Marin County Historical Museum has a great deal of archival video material on DVD, covering such historical events as the development of the oil industry, and rail and automobile transportation in Marin County. I spent many hours screening this material and obtained permission for its use in my project. I also shot original footage of relevant local subjects such as oil storage tanks, bicycle and highway traffic, and public transportation, as well as of Sustainability and Transition-related locales.

POSTPRODUCTION

If shooting video footage may be analogized to the gathering of data, the editing process resembles the analysis of data. Film/video editors use their skills to structure information to give it a narrative sense, and to make associations between images and actions. Thus the shots I selected and the order of their sequences reflect my conclusions about the logic of peak oil theory and the progress of the Sustainability and Transition groups' activities.

Upon completion of my interviews, I proceeded to select the segments of the interviews that I found useful and to digitize these shots, using my digital editing program Final Cut Pro. Beginning with over 30 hours of original footage of interviews and related material, I selected the best interview segments and began to build what is called an *assemble edit*. I also began to digitize shots from other documentaries and archives that I thought might be of use, while seeking to obtain permission for their use.

The process of digitally capturing footage took most of the summer. When I had completed digitizing the clips that I intended to use, I compiled an assemble edit of primarily interview footage. This initial version ran around two hours and 15 minutes, far longer than the 55-minute program I had projected in my proposal. I then began the arduous task of deleting footage that was off topic, repetitive, or less effective, and trimming the good clips to narrow their focus. In order to aspire to a level of intellectual depth, I wanted to avoid the 10-second sound bites so often found in television journalism. On the other hand, I wanted

to concentrate on the best portions of the clips, and avoid the impression of letting my subjects ramble.

My first rough edit ran about one hour and 50 minutes; it still contained mostly interview footage, with some cutaway shots added to break up the monotonous *talking heads* style. I asked my colleague John Hewitt, a professional documentary filmmaker and professor emeritus from San Francisco State University, to view this version and offer some feedback. Building on his suggestions, I cut about 20 minutes more from the video, bringing the running time down to 90 minutes. For a musical soundtrack, I selected Huli Curry, a music student at Dominican University, to compose a Philip Glass-style musical theme for the video; he signed a formal release and was paid a nominal fee for his work.

After editing in more B-roll footage to further minimize the video of the interviews, I sent this version to my committee in December 2010 and asked for a formative evaluation. Based on my committee's feedback, I made a few more changes, the most significant being the addition of new footage of myself as narrator, designed to clarify the chapter breaks in the program. This second unit footage was shot by Dominican Cinema major Brandon Florez. After adding in these several minutes of new footage and deleting an equal amount of old footage (to maintain the program's length), I added more cutaway shots and made a few structural revisions, in part based on a second evaluation by my colleague John Hewitt. Finally, I created my end titles and did a little bit of audio mixing and color/brightness correction to complete this project.

CHAPTER FOUR:

SUMMATIVE SELF-EVALUATION

Despite my extensive film and video production experience, I don't think I fully appreciated the challenges of acquiring cutaway or B-roll footage for a documentary video. On my virtually non-existent budget, I had no funds to buy stock footage, and most of my efforts to obtain permission to use clips from other documentaries went without any response. My suspicion is that these films purchased stock footage themselves for their films, and therefore didn't have the rights to authorize their use. The exceptions were the archival footage from the Marin History Museum and footage from the locally produced *Hidden Bounty of Marin* (Quirt and Rilla, 2009), for which I obtained permission for use of clips. I was therefore forced to turn to Fair Use and Copyright guidelines to determine how I might use footage from documentary works for which I did not have permission, and the literature in this area has been confusing and sometimes contradictory. This was a good learning experience, but required me to be creative in my search for supporting images, and limits my options for distributing the video. In the future, I won't attempt to produce a documentary requiring secondary footage without obtaining a grant (or some kind of funding) to purchase footage from professional stock footage companies.

I am proud to have produced this documentary, representing years of preparation and over a full year in actual production. I feel my interview questions were well formulated and my interview subjects proved to be well informed and articulate. But I was disappointed that some knowledgeable women

did not respond to my persistent requests for interviews, making my video somewhat imbalanced in terms of gender, especially in the opening segments. I was also disappointed at the lack of willingness of the part of many groups to allow videotaping of training workshops and committee meetings, and that I had few opportunities to document actual community outreach events. I anticipated producing a video that would be more balanced between interview footage and group interaction, but that did not come to pass.

I felt that some topics were covered very well and others less so. For example, in discussing alternative energy options, I obtained good interview material about alternative oil, coal, ethanol, solar and wind, but not much coverage of nuclear, hydrogen, or some others. But overall, I feel that I did an effective job of ordering the clips so the discussion follows a logical progression from topic to topic, and that the viewer will rarely become lost or confused by the flow of argument.

From a strictly technical point of view, in the editing process I became much more familiar with many features of Final Cut Pro. Since I teach Final Cut Pro in my Dominican University film/video classes, this experience will greatly enhance my teaching effectiveness.

Due to copyright restrictions that may limit public distribution of the video in public screenings or online, one avenue for moving forward may be to approach a professional documentary company with actual budgets, show them my project, and try to interest them in financing a more professional documentary that could make full use of stock footage.

I believe that this documentary does an effective job in explaining the basic concept of peak oil, of documenting its possible economic and psychological impacts, and of offering strategies for mitigation of these impacts, particularly through activism by Sustainability and Transition groups. I also hope that I have succeeded in presenting a balance between sober realism and creative, hopeful adaptation.

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APPENDIX A

QUESTONS FOR VIDEO INTERVIEWS

Here are possible questions or topics for my interviews, in no particular order. They will vary according to the specialization of the interviewee.

1. What in your view are the threats of climate change and peak oil to local communities?

2. How urgent are these challenges? What time frame do you think we are talking about?

3. What is the relationship between energy uncertainty and the larger economy?

4. What are the prospects that alternative sources of energy will compensate for the depletion of fossil fuels?

5. What specific challenges do oil depletion and energy uncertainty pose for transportation? Food security? Energy generation and distribution? Land use planning?

6. What is the relationship between citizen activism and municipal policy? How much can citizens' initiatives contribute to policy changes?

7. What psychological challenges do citizens face regarding energy uncertainty? What can public officials do to prepare people to deal with these challenges to their lifestyles?

8. Why is "relocalization" of food production and energy generation important? Explain the importance of "community resilience".

9. What conservation strategies and policies should be implanted to mitigate negative impacts of climate change and peak oil?

10. What has already been done or is being done in your community (Marin, San Rafael, Sebastopol, Willits, Cotati, etc.) to prepare for peak oil and/or climate change?

11. Explain the vision of the Transition Town movement, and evaluate its strengths and weaknesses.

APPENDIX B

VIDEO RELEASE

Date: _____

I, _____ (the undersigned) do hereby confirm my consent with respect to your photographing and interviewing me, voluntarily and free of compensation, in connection with your dissertation film/video project tentatively entitled:

Peak Oil & Transition

_____

I hereby grant to you, your successors, assigns, or licensees, the perpetual right to use as you may desire all still, motion picture, videotape and/or audio recordings which you may take of me or of my image and/or voice, including the right to use my name, likeness, and direct quotation from interviews, in or in connection with the theatrical or online exhibition, cablecasting, advertising, exploitation, or any other use of such audiovisual recordings.

In signing this release, I understand that:

* Participants will be identified by name and position/title in the program.

* Participants receive no guarantee of direct benefit from their participation, either to themselves or their organization.

* Participants assume all responsibility for any psychological or material risks involved in their participation. They agree to indemnify the producer and hold him harmless from any claims and demands arising out of or based upon my personal injuries and/or death, resulting directly from any act of negligence on their part while engaged in activities involving this production.

* Participants have the right to refuse to answer particular questions, as well as to discontinue participation at any time

* Original videotapes of interview and activities shall be stored in the possession of the producer, John Duvall. They shall be retained until completion of the production sometime before the end of 2010, after which they will be archived to protect against unforeseen complications in post-production and distribution. However, they will not be used for any subsequent productions.

Further questions may be addressed to John A. Duvall, (phone) 415-847-7449, (e-mail) hamzatula@yahoo.com.

If participants wish to refer to the Bill of Rights for Participants in Research, or have any concerns or are dissatisfied at any time with any part of the study, they may report their concerns (anonymously, if they wish) to the Chair of the Human Research Review Committee, California Institute of Integral Studies, 1453 Mission Street, San Francisco, CA 94103, or by telephone at 415-575-6114 or via email to bduchmann@ciis.edu.

By signing below I acknowledge that I have received a copy of this consent form:

Signature _____

Name (Print) _____

Home Address (optional) _____

Phone Number _____

Email Address _____

Initials _____

APPENDIX C
PROFESSIONAL BIOGRAPHY

I have been involved in film and video production for most of my life. My media education includes a BA in English from Indiana University (1973), which included courses in film history, film theory and screenwriting; an MFA in Cinema Production from the University of Southern California (1983), which covered all aspects of film production and postproduction; and an MS in Telecommunications Management from Indiana University (1996), which focused on video journalism and digital postproduction.

Professionally, in 1985 I produced two documentary videos about a poetry therapy program for the State of Indiana's State Hospital system. From 1983 until 1993, I served as a sound effects/foley editor in Hollywood, working at most of the major studios in Los Angeles, including working on Academy-Award winning and nominated films (*Dances With Wolves, Awakenings*). I am a member of the IATSE Editors Guild.

During 1995-96, I produced local news packages for Indiana University's Public Broadcasting affiliate in Bloomington, Indiana; worked as a documentary producer for BCAT, Bloomington's community access television station; and worked for Indiana University's media production agency, which served the needs of faculty and the university community.

Since 1997, as an Assistant Professor of Communications at Elon University (North Carolina) and Dominican University (San Rafael), I have taught cinema courses in film/video production, film aesthetics, camera operation, film/video editing, film history and film criticism. This long career in film and

video establishes my credentials to produce the current documentary that is the central focus of this dissertation.

To view the video production, go to this link:

https://www.youtube.com/watch?v=i1xaaboaIIU

or contact:

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