THE POLITICS OF RELIABILITY:

A SOCIOLOGICAL EXAMINATION OF THE STATE OF VERMONT'S RESPONSE TO PEAK OIL & CLIMATE CHANGE

By

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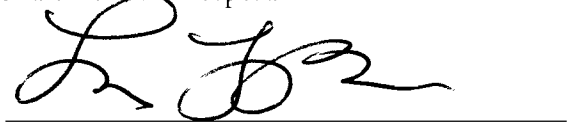

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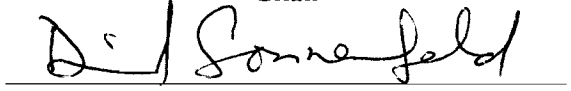

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Abstract

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The problems of global peak oil and global climate change are unlike any yet faced by modern industrial societies: every ecosystem and social system on the planet will be impacted. The U.S. Federal government appears to have abdicated responsibility for dealing with climate change and peak oil. So called "sub-national" forces–states, regions, and cities–subsequently have tried to pick up the slack. State efforts to help citizens prepare for, mitigate against, and adapt to peak oil and climate change have varied greatly. This dissertation examines the State of Vermont, which consumes the least amount of fossil fuels and generates the least amount of greenhouse gases of any state in the country.

The thesis that Vermont, the "greenest state in the country," is not acting reliably to help its citizens prepare for, mitigate against, or adapt to peak oil and climate change was largely borne out over the course of interviews with high ranking government employees and nonprofit organizations. Despite being the "greenest state in the country," Vermont creates, in the words of one interviewee, "a dull tool," for dealing with problems. Except for domain consensus that climate change is a problem, the majority of the characteristics of "high reliability organizations"–'big picture' communication and coordination, domain consensus, decentralized decision-making, extensive training, aggressive information seeking, and strong leadership–are not apparent in Vermont's response to peak oil and climate change. This dissertation explains how the environment of organizations (e.g., sunk costs), organizational characteristics (e.g., combinations of resources and schemas), and the cognitive practices of individuals within organizations (e.g., political ideologies) undermines the characteristics of high reliability organizations.

Although the details of this dissertation are specific to Vermont, the problems are likely endemic in other U.S. states and other forms of government. As state governments learn, shift gears, and recalibrate their activities to address the twin challenges of peak oil and climate change, it is important to recognize that the veneer of "greenness," "high policy," official representations of leadership, and technological infatuations, may mask underlying unreliable structures.

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Dedicated to the memory of

Dorothy Sawyer
&
Jennie Wendt

1. Introduction

"We've got to go beyond this existing system because it's truly not sustainable. And what does that mean? It's kind of like we're at a stage of history where we're trying to say what it means."
Executive Director from a Vermont nonprofit organization

The problems of peak oil and global climate change are unlike any yet faced by modern industrial societies: every ecosystem and social system on the planet will be impacted. Peak oil and global climate change both have their roots in fossil fuel dependency and energy consumption. The combustion of fossil fuels to power societal development and activities, as well as the clearing of carbon sinks such as forests for housing and other purposes has also increased the global mean surface temperature of the planet by about 1° Fahrenheit over the 20th century. Everything that gets described as civilization occurred over the past 15,000 years, during a temperate period known as the Holocene, or "long summer" (Fagan, 2004). Every sector of the global economy has been converted to fossil fuel dependency over the past 200 years. Anthropogenic climate change could spell the end of the long summer, while peak oil calls into question the progress of the past 200 years. The plea advanced by a small number of social scientists–that energy should be taken seriously since it is "fundamental to social organization and a central factor in society-environment interactions" (Lutzenhiser et al., 2001: 223)–may finally be answered as societies confront rising gas prices and temperatures, eroding coastlines, bleaching coral reefs, and melting glaciers. The ability to prepare for, mitigate against, and adapt to peak oil and climate change is going to be a major challenge for all segments of society.

Organizations such as government bureaucracies are designed and authorized to coordinate the work of many people to efficiently accomplish large-scale tasks (Blau, 1956; Mann, 1986), including energy and resource planning; ecosystem protection; and disaster preparedness, response, and mitigation. The ability of bureaucracies to handle large-scale events is not a foregone conclusion (Beck, 1992a, 1992b, 1996; Bigley and Roberts, 2001; Bierly and Spender, 1995; Vaughan, 1999). For example, in the aftermath of Hurricanes Katrina and Rita, the disastrous federal and state government responses were hampered by the absence of "1) clear and decisive leadership, 2) strong advance planning, training and exercise programs, and 3) capabilities for a catastrophic event" (Ginter et al.,

2006: 336; Cooper and Block, 2006). At the same time, modern societies are more technologically sophisticated, historically aware, scientifically knowledgeable, and interconnected than ever before. This "conjuncture of foresight and unprecedented willful power" (Pierrehumbert, 2006: 2) focuses attention on decisions made–and not made–by authorities. How are governments responding to the twin challenges of peak oil and climate change?

While 2006 was a breakthrough year for public awareness of the risks posed by climate change and peak oil–with Al Gore's *An Inconvenient Truth* attracting millions of movie-goers and increased media coverage of climate change (McCright and Shwom, 2008) and high gas prices–the U.S. federal government has appeared to abdicate responsibility for dealing with either climate change (Rabe, 2007a, 2007b; Lutzenhiser, 2001) or peak oil (GAO, 2007). Although the United States was a signatory to the Kyoto Protocol in 1997, neither the Clinton Administration nor the Bush Administration ratified it and, despite at least 175 Congressional hearings, the federal government has not been able to agree on anything "beyond climate research funding and voluntary reduction programs" (Rabe, 2007a: 1). As recently as September 28, 2007, President Bush renewed his call for voluntary actions to reduce greenhouse gas emissions, while rejecting mandatory caps. Likewise, the well-known *Hirsch Report* on the peaking of world oil production states that "Intervention by governments will be required, because the economic and social implications of oil peaking would otherwise be chaotic" (2005: 5). Unfortunately, a recent Government Accountability Office report found that "according to DOE [Department of Energy], there is no formal strategy for coordinating and prioritizing federal efforts dealing with peak oil issues, either within DOE or between DOE and other key agencies" (2007: 6).

We also know that the Bush Administration attempted to censor the work of top NASA climate scientist James Hansen (Revkin, 2006) and that ExxonMobil and corporate-conservative coalitions have spent millions of dollars to spread misinformation about climate change (Levy and Egan, 1998; McCright, 2007; McCright and Dunlap, 2003, 2000; Union of Concerned Scientists, 2007). So called "sub-national" forces–states, regions, and cities– have subsequently tried to pick up the slack through, for example, the creation of the Climate Registry, the U.S. Mayors Climate Pro-

tection Agreement, renewable portfolio standards and other civic and local initiatives such as Portland, Oregon's Peak Oil Task Force (Rabe, 2007a, 2007b; Peirce, 2006).[1]

Rabe identifies five factors that explain why a "State-centric" approach has come to dominate U.S. climate policy:

1) Economic self-interest (e.g., jobs created through biofuels development)
2) Risk avoidance (e.g., the experience of violent storms has triggered action)
3) Leadership (e.g., efforts to be "first movers" and capture markets)
4) Network development (e.g., significant policy and advocacy networks working in state capitals)
5) Tactics not available at the federal level (e.g., litigation against federal institutions) (2007a: 4).

Rabe's macro-analysis of state climate policies reveals a divided country, ranging from "low emissions/high policy" states such as California and Massachusetts that have adopted many climate mitigation policies and reduced their per capita emissions, to "high emissions/low policy" states such as West Virginia and Louisiana that have not created policies or reduced their emissions. His research also highlights the "economic desirability vs. political feasibility" conundrum: even low emissions/high policy states have avoided carbon *tax* legislation in favor of more palatable renewable portfolio standards and cap and trade systems (2007a).

Rabe's 30,000 foot view provides an invaluable perspective to the usual argument that America is disengaged from climate policy. What a 50-state macro-analysis gains in interesting comparisons, however, it loses in specificity and detailed, contextual explanations. For example, what variables explain how a state can demonstrate leadership on some aspects of energy and climate policy while exhibiting "recreancy" (Freudenburg, 1993) on others? What kinds of social structures grease the wheels of intra- and intergovernmental coordination? What barriers stand in the way of "high policy"? Under what conditions is leadership really just a "social representation" (Laroche, 1995), an illusion of action? Under what conditions can a state have low emissions and high policy but still not coordinate to prepare for, mitigate against, or adapt its citizens to peak oil and climate change? How do some problems (e.g. climate change) get recognized as risks by state governments, while others are not part of the lexicon (e.g., peak oil)?

1 See also http://www.pewclimate.org/what_s_being_done/in_the_states/emissionstargets_map.cfm; http://postcarboncities.net/peakoilresponses; and http://www.abanet.org/abapubs/globalclimate/stateupdate4-30-07.pdf

If it is the case that states will continue to lead the nation in climate and energy policy, then how can high emissions/low policy states become low emissions/high policy states? What lessons can be learned from the experiences of low emissions/high policy states? Are there other factors beyond the five identified by Rabe that help to explain (lack of) leadership and (lack of) action in addressing peak oil and climate change? Are there other factors that explain variation in state responses? These questions, and others, indicate that it is necessary to supplement Rabe's research with case studies that dig deeper into the experience of state governments. Additionally, it is important for analyses to focus on both climate change *and* peak oil because they are interconnected problems and some of the "solutions" offered to mitigate against peak oil will continue to pump out greenhouse gas emissions, exacerbating climate change. For example, the *Hirsch Report* suggests that, the most practical "wedges" to fill the upcoming oil gap are fuel efficient transportation, enhanced oil recovery, coal liquefication (turning coal into gas), and refining tar sands (2005: 53). While efficiency may reduce emissions, the other options will ensure a continuing commitment to greenhouse gas emissions and climate change (cf. Kharecha and Hansen, 2007). To my knowledge, no comparable investigation of state response to peak oil and climate has taken place in sociology or environmental sociology.

1.1. Thesis Statement:

Stallings writes that disasters "provide opportunities to examine aspects of social structures and processes that are hidden in everyday affairs" (2002: 283). My view is that the unfolding disasters of peak oil and climate change provide an opportunity to examine, understand, and explain the way that social structures such as state governments enable and/or constrain preparedness, mitigation, and adaptation strategies. I focus on the government of the State of Vermont, where I have lived and worked for the past four years. Vermont is a small, rural state in the Northeast with a liberal/progressive reputation (e.g., it was the first state to abolish slavery, it has the only self-proclaimed socialist U.S. Senator in Bernie Sanders)- so liberal, in fact, that it is the only state in the country that President Bush has not visited during his terms in office. Vermont also has strong green credentials: according to *Forbes Magazine*, Vermont is the greenest state in the country,[2] largely because of the existence of

2 Url: http://www.forbes.com/businessinthebeltway/2007/10/16/environment-energy-vermont-biz-beltway-cx_bw_mm_1017greenstates.html

Efficiency Vermont (an efficiency utility), and the state's carbon neutral status. However, **my thesis is that–despite the risks and despite being the "greenest state in the country"–Vermont's state government is not acting *reliably* to prepare for, mitigate against, and adapt Vermont to peak oil and climate change.**

In this paper, reliability refers to "the capacity to continuously and effectively manage working conditions, even those that fluctuate widely and are extremely hazardous and unpredictable" (Bigley and Roberts, 2001: 1281). Preparation refers to developing mitigation or adaptation responses. Mitigation refers to efforts in advance of a threat or risk that are aimed at limiting, reducing, or avoiding that risk. Adaptation refers to "adjustments in ecological-social-economic systems in response to actual or expected" stimuli and their effects or impacts (Smit et al., 2000: 225; see also Easterling et al., 2004; Gunderson and Holling, 2002; Reilly and Schimmelpfennig, 2000). A reliable response would ensure the *resiliency* of ecosystems and the *sustainability* of social systems by developing strategies to prepare for, mitigate against, and adapt to peak oil and climate change.

In the aftermath of Charles Perrow's "normal accident" theory (1999 [1984]), which predicts that all tightly coupled, interactively complex systems are prone to sudden, unexpected problems from unanticipated subsystem interactions, disaster studies/risk management researchers have scanned the horizon to find ways to minimize the frequency and severity of disasters. In studies of aircraft carriers, air traffic control systems, utility grid management, fire fighting teams, and other organizations, these researchers believe they have found examples of **"high reliability organizations"** (Drabek, 2005; Bigley and Roberts, 2001; Roberts and Bea, 2001; Bierly and Spender, 1995) and **"high reliability networks"** (Ginter et al., 2006) that "exhibit continuous, nearly error-free operation, even in multifaceted, turbulent, and dangerous task environments" (Bigley and Roberts, 2001: 1293). Researchers believe this is the case because high reliability organizations (HROs) exhibit:

- strong leadership (i.e., characterized by clear communication of responsibilities and measurable outcomes),
- a high level of domain consensus (i.e., agreement on the nature of the problem),
- 'big picture' communication and coordination,
- decentralized decision-making,
- aggressive information seeking (i.e., finding out what the organization does not know), and

- extensive training (i.e., HROs spend disproportionately more money than other organizations training people to recognize and respond to anomalies [Roberts and Bea, 2001: 72]).

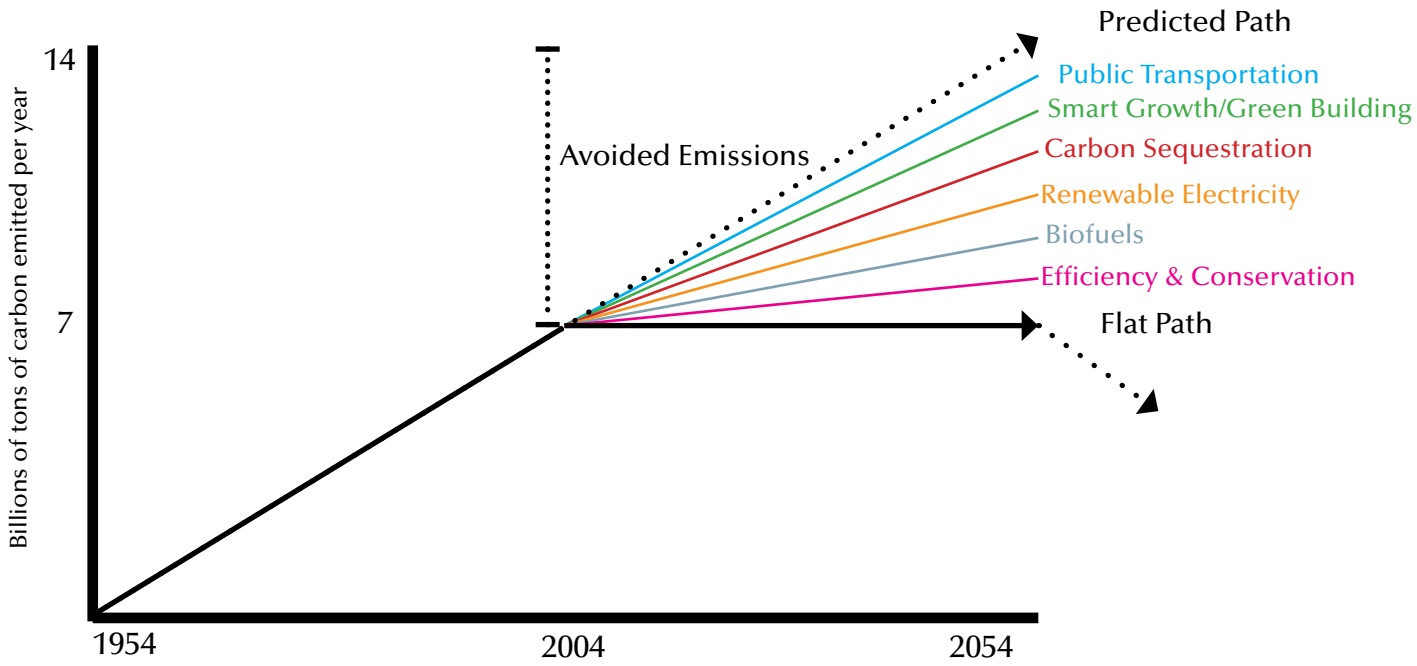
Incident command systems (ICS), which provide the "efficiency and control benefits of bureaucracies" while avoiding the inertia of bureaucracies, are frequently a central component of HROs (Bigley and Roberts, 2001: 1281). ICSs are characterized by three main features: 1) a structuring mechanism that establishes the ICS at the beginning of an incident, and also allows for the possibility of "role switching" (i.e., the reassignment of personnel) and "authority migration" (i.e., the decoupling of authority from hierarchies to individuals who possess the most expertise); 2) support for constrained improvisation; and 3) a "cognition management" methodology that devotes considerable attention to developing, communicating, and connecting individuals' understandings of the situation (1286-1291).

Bill McKibben, scholar-in-residence at Middlebury College (in Vermont) and author of the *The End of Nature* (1989), the first book on climate change for mainstream audiences, writes that "Political and economic will has stood still" since his book was published. "It is the contrast between the pace at which the physical world is changing," he continues, "and the pace at which the human society is reacting that constitutes the key environmental fact of our time" (2006 [1989]: xv). **Can governments operate as high reliability organizations? Is it unrealistic to expect governments to perform reliably?** Ginter et al. admit that the "lessons learned in managing HROs have not been systematically applied" to governments (2006: 331). Bigley and Roberts suggest it is possible that the domain consensus evident in most HROs "reduces the severity and occurrence of behaviors such as political acts and power struggles" that are commonplace in government (2001: 1295).

On the other hand, in a global risk society, with "increasingly unforgiving social-political-economic contexts" (Bigley and Roberts, 2001: 1281), where many of the risks originate in elite decision-making (Beck, 1992a, 1992b, 1996), and where all of the indicators of previous societal collapses are evident, it does seem appropriate to gauge government response to risks against what are considered "best practices" for avoiding disaster. The main critique raised against the HRO concept has been that the systems studied by HRO proponents are limited in their applicability to high risk systems since they are neither interactively complex and tightly coupled according to Perrow's

definition, nor is "unresolved technical uncertainty" involved (Marais et al., 2004: 4). The critique advanced by Marais et al. is also an *endorsement* of applying lessons learned from HROs to systems where the necessary actions are *known*. In the cases of peak oil and climate change, Pacala and Socolow write that "Humanity already possesses the fundamental scientific, technical, and industrial know-how to solve the carbon and climate problem for the next half-century" (2004: 968). They advocate a "stabilization wedge" approach that stacks a range of demand- and supply-side alternatives together (Figure 1).

Figure 1. Hypothetical Climate Stabilization Wedges



Adapted from Pacala and Socolow, 2004.

As early as 1977, Amory Lovins was writing about "flexible, resilient, sustainable, and benign" "soft" energy paths that could sharply diminish our use of fossil fuels and nuclear energy (38). The Brundtland Report defining sustainable development came out nearly two decades ago and in the intervening years any number of natural scientists, social scientists, communities, businesses, government officials and writers have been offering sustainable solutions for all of our ecological problems (Pahl, 2005; McDonough and Braungart, 2002; Schor and Taylor, 2002; Hawken et al., 1999; Benyus, 1997; Hawken, 1993; Daily and Ehrlich, 1992; Redclift, 1992; Lele, 1991; Rosenbaum, 1987; McHarg, 1992 [1969]). With regards to peak oil, the Rocky Mountain Institute believes that a $180

billion investment in making automobiles, buildings and utilities use oil more efficiently can buy time to develop substitutes such as biofuels and biomaterials, saved natural gas and hydrogen (Lovins et al., 2005). Making buildings and vehicles more efficient, they calculate, will halve U.S. petroleum consumption by 2025, with the other 50 percent coming from biofuels, saved natural gas and hydrogen. In other words, the characteristics of a reliable, safe, and sustainable response to peak oil and climate change are known.

Finally, general features of HROs may already be present in state government, or can be developed in state government (e.g. leadership, coordination). It is certainly the case that the absence of HRO characteristics–reliability, leadership, coordination–in state government are frequently and critically noted. Most state governments are familiar with and utilize ICSs to respond to accidents, emergencies, and disasters. Disaster studies/risk management scholars also believe that more and more organizations will take on features of HROs:

> *"The demanding task situations to which an increasing number of mainstream organizations are exposed have much in common, in an abstract sense at least, with those high-reliability organizations manage. Both are often characterized by substantial complexity, ambiguity, dynamism, risk, and time constraints. As a result, Weick and his colleagues (1999: 82) suggested that high-reliability organizations represent "harbingers of adaptive organizational forms for an increasingly complex environment" and "provide a window on a distinctive set of processes that foster effectiveness under trying conditions"" (Bigley and Roberts, 2001: 1293).*

More specifically, then, my analytical lens for understanding, evaluating, and explaining state government response to peak oil and climate change are HROs. My thesis is that Vermont's state government is not acting like an HRO exhibiting 'big picture' communication and coordination, decentralized decision-making, extensive training, aggressive information seeking, and strong leadership on peak oil and climate change. In particular, I am hypothesizing that this is the case because:

► The "cognitive practices" (Vaughan, 1999) of government personnel reflect a lack of concern (Lutzenhiser et al., 2002), anticipation (Diamond, 2005), perception (Diamond, 2005), and intuitive awareness (Kahneman, 2003) about the risks posed by peak oil and climate change. The ideology of the Republican Party, characterized by a strong anti-tax stance and "a general hostility to government and liberalism" (Domhoff, 1998: 4), precludes strong leadership on the part of Governor James Douglas (Republican) in addressing peak oil and climate change.

► "Organizational characteristics" (Vaughan, 1999), including the capacity (Lutzenhiser et al., 2002) to prepare for, mitigate against, or adapt to peak oil and climate change are not well developed in Vermont's state government; Vermont's Agencies are strapped for resources, staff are not coordinating amongst themselves and other organizations, and Vermont's Executive Branch is not coordinating with its Legislative Branch.

► The "environment" (Vaughan, 1999) of Vermont's governmental organizations, is composed of an array of constraining internal and external factors, including: sunk costs (Hannan and Freeman, 1977) such as maintaining the state's built environment, a global economic treadmill of production that demands increasing profits (Schnaiberg and Gould, 1994), an adversarial political system, expiring electricity contracts, resource depletion, and climate change.

The next section gets the ball rolling by providing some brief background information on Vermont's energy and greenhouse gas emissions situation.

1.2. Vermont's Energy and Climate Picture in a Nutshell

Vermont (population approximately 624,000) consumes the *least* energy (about 157.6 trillion Btus[3] or .16 percent) of any state in America, lower even than the District of Columbia. Vermont also emits the lowest amount of greenhouse gases (about 9.1 million metric tons in 2005, which is equal to about .13 percent of national emissions) of any state in America. In fact, Vermont is currently in the unique position of being a *net carbon sink*. The majority of Vermont's electricity–generated at Vermont Yankee and Hydro Quebec, with biomass, small hydro, market purchases, and a small wind facility providing the rest–is considered carbon neutral. Vermont Yankee was constructed in 1972, long before climate change was a concern, and the overall objective for entering into contracts with both sources was cheap, reliable energy. Seventy-eight percent (4,628,900 acres) of the state is covered in forests. These forests act as *carbon sinks*, sucking in an estimated 9.7 million metric tons of carbon dioxide in 2005, or 600,000 more tons of greenhouse gases than Vermont's 621,000 cars and residential, commercial, and industrial space heating needs generate (Center for Climate Strategies, 2007: v). However, this is slated to change. The state's contracts with Vermont Yankee and Hydro-Quebec are set to expire in 2012 and 2015, respectively. Vermont is likely to sign new contracts–at higher rates–but eventually Vermont Yankee will be de-commissioned and new electricity sources will have to be developed. The Center for Climate Strategies, the organization hired to facilitate the Governor's Commission on

3 A Btu (British thermal unit) is the amount of energy required to rise the temperature of one pound of water by one degree Fahrenheit.

Climate Change, projects that even under a low emissions scenario, Vermont's emissions will exceed its carbon sinks from 2012 through 2030, *if* the state does not pursue new demand side management programs. The timing is fortuitous, therefore, for Vermont to develop a strategy to maintain a low emission, reliable energy system that simultaneously helps Vermonters prepare for, mitigate against, and adapt to peak oil and climate change. To date, Vermont's state government has advanced several energy efficiency and greenhouse gas emissions reduction programs and policies, while struggling to agree upon, advance, and/or achieve other goals.

1.3. What has Vermont Done so Far?

Each Vermont state Agency—and the various Departments within each Agency—is responsible for specific tasks and responsibilities, while Governor Jim Douglas (Republican), Lieutenant Governor Brian Dubie (Republican), and the Legislature (Democrat majority) are responsible for creating a vision and policies that guide each Agency (See Page 76-78 for a listing of Agencies and Departments). Which governmental organizations are responsible for preparing for, mitigating against, and adapting to peak oil? Which governmental organizations are responsible for preparing for, mitigating against, and adapting to climate change? While the short answer is that none of Vermont's state Agencies or Departments are specifically tasked with ensuring a reliable supply of liquid fuel or dealing with climate change, some activity related to these topics has recently taken place:

► Efficiency Vermont–an "efficiency utility" created by the Legislature–is a nationally-recognized leader in energy efficiency, saving Vermont over 58 million kWh in 2004 (However, over two-thirds of Vermont's electricity is generated by a nuclear reactor, Vermont Yankee, and a hydroelectric dam, Hydro Quebec, so most of Efficiency Vermont's activities do not address liquid fuel energy sources);

► Lieutenant Governor Dubie carries around a vial of biodiesel wherever he goes and is a strong proponent of "The Green Valley"- a vision of Vermont as a world leader in environmental technologies;

► Vermont is a signatory to the Regional Greenhouse Gas Initiative, an effort to develop a greenhouse gas cap-and-trade system for the New England and Mid-Atlantic states;

► Governor Douglas's Executive Order 14-03 created a Climate Neutral Working Group (CNWG) to direct Agencies and Departments to reduce greenhouse gas emissions from state buildings and operations by purchasing only energy-consuming devices that meet or exceed the Energy Star® or comparable standards; purchasing vehicles that have the highest available fuel efficiency in each respective

vehicle class; and encouraging transportation alternatives for state employees;

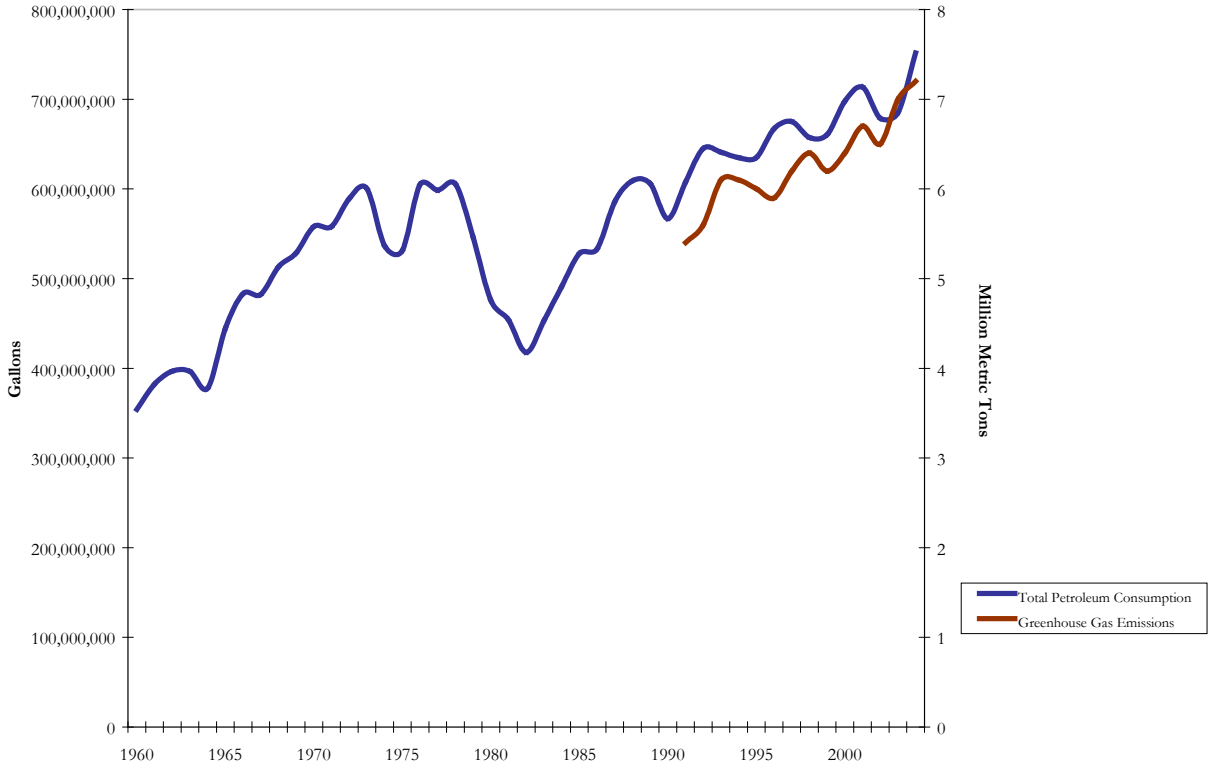
► Act 168, signed into law by Governor Douglas in 2006, stipulates that Vermont will reduce its emissions of greenhouse gases from the 1990 baseline by 25 percent by January 1, 2012, by 50 percent by 2028, and, if practicable using reasonable efforts, by 75 percent by January 1, 2050. Governor Douglas's Executive Order 07-05 established a Commission on Climate Change that is producing an inventory of existing and planned actions that contribute to greenhouse gas emissions and ways that Vermont can avoid those emissions;

► The Vermont Legislature has mandated that vehicles sold after 2009 in Vermont meet California's strict air emission standards. This decision was challenged in a lawsuit filed by the automobile industry. U.S. District Court Judge William Sessions recently ruled in favor of Vermont, establishing the right of states to set their own air pollution standards for automobiles sold within their boundaries. (Vermont's hybrid vehicle fleet currently makes up less than 1 percent of the vehicles in the state. Vermont's biodiesel consumption also currently makes up less than 1 percent of total diesel consumption. Estimates for ethanol are not available).

► State Senator Peter Shumlin (President Pro Tem) made combating climate change the top priority of the 2007 Legislative session.

Ulrich Beck's hypothesis that "Political stability in risk societies is the stability of not thinking about things" (1992b: 101) is clearly not substantiated in Vermont: the state government is not oblivious to climate change, risk management, environmental problems, or efficiency issues. At various stages, the Administration and Legislature have both demonstrated characteristics of HROs. On the other hand, Beck's assertion that "Protection diminishes as the danger grows" (1992b: 101) highlights the consequences of unreliable responses to peak oil and climate change: The issue is that the peak oil and climate change literatures are literally talking about the possibility of global societal collapse. Even with some attention devoted to these problems, Vermont's petroleum consumption and greenhouse gas emissions both continue to rise (Figure 2), and Vermont's recent energy and climate actions have been marked by a lack of coordination, communication, leadership, and reliability at precisely the time that urgent, reliable action to address peak oil and climate change is necessary. Although Vermont is a small state, lessons learned from this project should be useful to both low emissions/high policy states and high emissions/low policy states of any size that have a vested interest in learning about barriers to reliability and ways to improve their performance.

Figure 2. VT's Total Petroleum Consumption (1960-2004) & Greenhouse Gas Emissions (1991-2004).



Source: Energy Information Administration

1.4. Recreancy and Reliability

Several examples of "recreancy," which Freudenburg defines as "a retrogression or failure to follow through on a duty or trust" (1993: 916) have triggered my investigation. For example, the New England and Eastern Canada 2005 Report Card on Climate Change Action gives Vermont a "C". While this report card gives Vermont's state government kudos for creating a Climate Neutral Working Group, it states that "Vermont has yet to develop even a basic plan to address climate change at the state level. A comprehensive plan is needed and an inclusive stakeholder process must be established to create the plan as soon as possible." The Vermont Alliance of Conservation Voters gives Governor Douglas a "D" for energy policy, mainly for "largely" dismissing renewable energy, energy efficiency and small distributed generation in the state's 20-year electric energy plan, as well as paying "scant attention to fossil fuels, transportation energy use, greenhouse gas emissions, environmental impacts of energy choices or energy affordability for low-income Vermonters or seniors on fixed incomes." Three examples of marquee policies–the Climate Neutral Working Group, the

Governor's Commission on Climate Change, and House bill 520–form the cornerstone of my argument. In each case, inklings of characteristics are evident and, in each case, the absence of HRO has compromised the ability of each program to prepare for, mitigate against, and adapt the State of Vermont to peak oil and climate change:

Climate Neutral Working Group (CNWG)

In 2003, Governor Douglas signed Executive Order, #14-03, directing state Agencies and Departments to reduce greenhouse gas emissions from state government buildings and operations. The results of these efforts have not been significant to date. The second biennial CNWG[4] report found that "It is apparent that Vermont State Government is faced with a substantial challenge to reduce energy consumption and CO_2 emissions consistent with the goals" of #14-03. Emissions related to building space heating and building electricity consumption increased, while state vehicle fleet emissions decreased slightly from 2005 to 2006, mainly due to the purchase of 25 Honda Civic hybrids. However, the CNWG does not expect to see any emissions reductions in employee commuting, since no programs or incentives have been developed. Interviews with government employees involved with the CNWG revealed difficulties from the get-go: "We were charged with really kicking the Climate Neutral Working Group in the ass and making things happen because it was deadly. We could not get out of our own way on the Climate Neutral Working Group until [Governor] Douglas said 'screw it' and gave it to BGS [the Department of Buildings and General Services]." BGS then had to do "quite a few gymnastics" to collect energy use information for the buildings it manages, and spent a huge amount of time collecting and creating missing data for other Agencies in order to establish a baseline profile of state energy use and greenhouse gas emissions (i.e., it aggressively sought out information).

Interviews for this project revealed communication problems (including canceled and irregular meetings), lack of domain consensus, a sense that some of the reports utilized were whitewashed, turf issues around which Agency/Department is responsible for which activity, and coordination problems. An interviewee from BGS explained:

4 Url: http://www.anr.state.vt.us/air/planning/docs/cnwg%202nd%20%20Biennial%20Report%204-2007.pdf

"It's the old communication thing. For instance, even during the bureaucratic piece on what we're trying to do for the individual Agency energy implementation plan, they don't get it. They don't get how to track data, something as simple as that. We haven't made it easy enough for them to do with. Our financial system is a major tool, a program called VISIONS, which is almost impossible to manipulate and change to be responsive to what you need now. So, we have these institutional hurdles and we have a little bit of a turf issue."

An interviewee from a different Agency offered this assessment, which addresses issues of leadership, coordination, and other barriers to reliable performance:

"It's an inter-Agency thing, which is not going well in my mind. It's DEC [Department of Environmental Conservation], DPS [Department of Public Service], and BGS [Buildings and General Services]. We're there to provide technical knowledge. We actually have the capacity to do more, but we're not allowed to because they're in charge. The Commissioners pay little attention to it, meanwhile, the Governor is going off and talking about it all the time. And that's where I think they're going to be caught with their pants down. Really, nothing happened, if you read the report. But what has been going on to [BGS's] *credit, they're really pushing the Agencies to do energy planning. And we're doing that. It's far from being quantified because, for instance, this building is all leased space. Those light switches over there control the entire floor."*

Even when BGS invests in activities such as installing technologies to make buildings they own more energy efficient, they have not had the resources to follow-up on why the buildings are not achieving consumption reductions (e.g., operator and tenant education courses):

Well, I hope I'm not too pessimistic, but I know there's a long row to hoe. What I see is, we've invested a lot in green buildings, sustainable buildings, some aspect of green and sustainable buildings, and I'm not seeing a great rate of return. I'm not seeing a lot of reduced energy use or reduced energy consumption."

Governor's Commission on Climate Change (GCCC)

In 2005, Governor Douglas's Executive Order 07-05 established a Commission on Climate Change[5] that was charged with producing an inventory of existing and planned actions that contribute to greenhouse gas emissions and ways that Vermont can avoid those emissions. The Center for Climate Strategies was hired to facilitate the process and a plenary group, composed of government employees and representatives from Vermont's nonprofit, business, and educational communities was formed. Ernest Pomerleau, the largest private land developer in the state, was appointed chair of the Commission. Technical working groups (Transportation and Land Use; Energy Supply and Demand;

5 Governor's Commission on Climate Change: http://www.vtclimatechange.us/

Agriculture, Forestry and Management; and Cross-Cutting Issues) within the plenary group met over the course of a year, and seven meetings between the plenary group and the Commission took place. The final report of the Commission, due September 1, 2007, was delayed one month.

An interview conducted at the beginning of the process with a member of the plenary group (a representative from a nonprofit) revealed considerable skepticism about the process. When asked if the GCCC was a meaningful activity, he replied:

> *"It's a meaningful gesture (laughs). There are lots of meaningful gestures. Some of them include middle fingers! The proof is in the pudding. It just started. At the last plenary group meeting this past week, I mean Ernie Pomerleau the chair, who I like, nice guy, also a very conservative Republican developer. The largest land developer in the state. He's chair of the Commission. There's a reason for that. He is the filter and nothing will go to the Governor that the Governor does not want to go to the Governor. And you've already got Ernie saying, 'Well, I'm more interested in finding common ground and more interested in finding consensus. I don't like sticks, I'm much more into carrots. We'll find some carrots versus sticks.' It's like, if your approach is that limited to begin with, and we already know where the Governor is on some issues, the problem with climate change is that nowhere are the scale of the solutions matching the scale of the problem. Every one's patting themselves on the back for doing feel-good stuff about global warming and not looking at the fact that we're losing. Our emissions are going up on an annual basis. And I think it's dishonest to say 'I've got a Commission and I've got these goals and we're going to try to meet them', and then not actually implement policies that would allow you to meet them.'"*

At the final meeting of the plenary group, I personally witnessed a lack of domain consensus, coordination, and communication, as the Commissioner of the Department of Public Service (the Vermont Department that regulates electric utilities and produces Vermont's energy plan) explained that his chief responsibility was to rate payers and tax payers before voicing his opposition to a proposed policy that the Center for Climate Strategies calculated would *save* Vermonters the most money and reduce the most greenhouse gas emissions. A government employee involved with the GCCC was equally confused about this opposition, but attributed it to poor coordination on the part of the facilitators and lack of Administrative leadership:

> *"Well, you know, I don't have a lot of respect for the people who did it. I don't have a lot of respect for ANR* [Agency of Natural Resources]- *they didn't manage their consultants properly. The administration didn't knock heads. The last meeting was ridiculous. Those guys shouldn't have been standing up and opposing stuff. They should have known from*

the beginning what the process was. They should have engaged in the process and then they should have resolved the issues."

H.520

Most significantly, House Bill 520[6] has been a topic of heated debate in 2007. Among other things, the Democrat-introduced bill originally sought to create a heating fuels efficiency utility (similar to Efficiency Vermont) to reduce the use of heating fuels by levelling a small surcharge on heating bills. The surcharge would then be used to fund weatherization activities so that homes and businesses would consume less heating oil. When (Republican) Administration opposition to the surcharge proved insurmountable, the Legislature switched to a new, temporary tax on Vermont Yankee (Vermont's nuclear reactor) to fund the program. The Legislature recently passed the sweeping new legislation, with endorsement from environmental groups such as Vermont Public Interest Group and the Vermont Natural Resources Council, business support from Vermont Businesses for Social Responsibility (the largest organization of its kind in the United States), and support from Vermont's Congressional delegation. The bill was opposed by the Vermont Fuel Dealers Association, Associated Industries of Vermont, the Department of Public Service (the organization responsible for state energy planning) and by Governor Douglas, who exercised his veto power.

In early June 2007 former Vice President Al Gore publicly endorsed Vermont's legislation and encouraged the Democrat-led Legislature to override the veto. "This legislation would position Vermont at the forefront of this growing global movement," Gore said, "I hope you get this override and put this terrific law into place." Governor Douglas is quoted as saying "Unfortunately, they choose to ignore my point of view," while Senator Shumlin is quoted as saying that engaging Governor Douglas on climate change "has been a challenge, to put it mildly." To an alternative proposal put forward by Governor Douglas, Shumlin adds, "I feel a little bit like the bride who never saw the diamond. If that was a proposal, he made it in the most shy and understated way" (Porter, 2007a). On July 11, 2007, Vermont's Legislature reconvened but failed to override the Governor's veto. The Governor is now advancing the aspects of H.520 that he agrees with and other ideas through "administrative decree," which means that various Agencies and Departments have been tasked with certain

6 State of Vermont Legislature: http://www.leg.state.vt.us/docs/legdoc.cfm?URL=/docs/2008/bills/passed/H-520.HTM

responsibilities, consisting mainly of studies. One of the Agency personnel explained:

> *"There's 20 odd studies that are all due December 15th. Well, now we're just doing them. Internally, we're debating how closely we need to follow the letter of the law. Item 23 is an efficient transportation study. It's very poorly written. I don't know what it means and I'm in the business. Do we have to follow this?"*

A recent editorial from *The Times Argus*, a local newspaper, summarizes the lack of coordination that has characterized the H.520 controversy:

> *"The latest go-round between the Douglas administration and Democratic leaders about energy conservation shows Gov. James Douglas floundering in an effort to take leader ship where until now he has been mainly an obstacle. Last month Public Service Commissioner David O'Brien asked the Public Service Board to launch an investigation into ways the state could initiate a program to curb the use of "all fuels" – heating oil and other fuels used in homes, businesses and other buildings.*
>
> *James Volz, chairman of the Public Service Board, responded that without legislation authorizing the board to spend money on the study, the board could not do so. The irony is rich.*
>
> *Douglas' most controversial action this year was his veto of H.520, the bill that would have authorized the PSB to conduct the kind of study Douglas, after his veto, decided to request. The PSB was ready and willing, given the authority, to determine the best way to establish an all-fuels efficiency program, but Douglas' veto deprived them of the authority" (08/12/2007).*

1.5. Implications for Vermont and the Nation

The implications of inadequate preparation, mitigation, and adaptation are significant for Vermont's communities, businesses, and ecosystems. For example, about 177,000 housing units, or greater than 58 percent of all housing units in the state, use oil for space and water heating. Since Vermont is a rural state, composed of many small, dispersed towns, residents drive a lot to and from work, for recreation, etc. A recent study found that "No other state in New England derives as large a share of its global warming emissions from the transportation sector" (Vermont Public Interest Research Group, 2005: 7). Recent fuel price increases give a hint of the implications of peak oil for Vermonters: the cost of heating oil increased 70 percent from 2001 to 2007, while the price per gallon of gasoline increased 98 percent. Vermont's iconic maple trees produce more syrup per

year–450,000 gallons (36 percent)–than any other state, adding over $13 million dollars to the local economy.[7] It turns out that the cycle of freezing and thawing that makes sap run turns maple trees into canaries in the coal mine for global climate change. Vermont's growing season starts and ends sooner than it used to, and many sugar-makers are concerned about their livelihood (Hotz, 2006). In fact, Vermont's maple trees are predicted to migrate north, impacting tourism, maple sugaring, and ecosystem resilience (Clean Air-Cool Planet, 2005).

The effect of modern traumas such as Three Mile Island, Chernobyl, and Hurricane Katrina, has been to erode civic trust in the ability and authority of governments to provide safety nets (Erikson, 1994). For example, in their examination of the Hurricane Katrina disaster, Cooper and Black assert:

> *"If, after four years and billions of dollars spent on preparedness, Homeland Security can't handle a hurricane, it is likely to struggle when faced with any manner of other disasters. The preparation and response to Hurricane Katrina should disturb all Americans. If New Orleans is vulnerable, so are we all" (2006: xvii).*

Likewise, if the response of the "greenest state in the country" in addressing peak oil and climate change is not reliable, then it is likely that most states in America are not acting reliably. Additionally, if Vermont is not providing a reliable response model, then it is not clear how high emissions/low policy states, or any other states for that matter, can be expected to develop a reliable response to peak oil and climate change. Both the *Forbes* report and Raab's studies provide a disservice to the extent that they do not provide any context for their findings. Vermont's green-ness is partly intentional and mostly circumstantial: the state has the lowest fossil fuel consumption and greenhouse gas emissions because it has a small population and nuclear energy; the state is carbon neutral because it has a lot of trees; the state has a low amount of toxic waste because there is comparatively little industry; etc. Most states are unlikely to pursue a policy of lowering population, limiting industry, and reforestation to address peak oil and climate change.

In this light, the state government's reaction so far has lacked the necessary urgency and reliability for confronting and leading the response to climate change and peak oil. My thesis is

7 New England Agricultural Service. 2007. *Maple Syrup 2007*. Accessible at http://www.nass.usda.gov/Statistics_by_State/New_England_includes/Publications/0605mpl.pdf

that–despite the risks and despite being a low emissions/high policy state–Vermont's Executive Branch (composed of the Governor, Lieutenant Governor and six state Agencies) and Legislature are not acting reliably to prepare for, mitigate against, and adapt Vermont to peak oil and climate change. Thus, the central line of investigation I am taking with my dissertation is: What factors explain how Vermont's state government is responding to peak oil and climate change?

"The Long Emergency"

But first, Chapter two answers the question: "why are peak oil and climate change unprecedented problems?" This chapter establishes the magnitude of the problems posed by peak oil and climate change, namely by showing that they can lead to societal collapse.[8] This chapter highlights the explanatory power of environmental sociology: it utilizes Lee Freese' (1997a) model of the evolution of biosociocultural regimes to demonstrate that the sustainability of human societies is a function of the relationship between ecosystem energy production, human energy and material expropriation, and the ecosystem transformations that result from withdrawals of energy and matter and additions of waste and pollution. Insights, data, and information from Vermont "personalize" the story of peak oil and climate change to reveal considerable vulnerability.

Pieces of the Puzzle

If climate change and peak oil are unprecedented problems that have the ability to cause global societal collapse, why aren't governmental institutions acting reliably to help their citizens prepare for, mitigate against, and adapt to them? Why aren't governments acting like HROs? Chapter three draws on a large body of theory and research in mainstream sociology and environmental sociology to answer these questions. These literatures were selected because they share a common interest in understanding how social structures, organizational cultures, and personal concerns influence *decision-making*, for good and ill.

► Classical sociology: For example, Giddens' (1984) "structuration" theory, and Sewell's (1992) elaboration of Giddens, suggest that combinations of resources and schemas can form durable structures that can either enable or constrain action. My research therefore considers combinations of resources (e.g., Agency budgets) and cultural schemas, rules, and toolkits (e.g. a rejection of taxation

8 The geographer and historian Joseph Tainter defines collapse as "a rapid, significant loss of an established level of sociopolitical complexity" (1988: 4). Biogeographer Jared Diamond characterizes collapse as "a drastic decrease in human population size and/or political/economic/social complexity, over a considerable area, for an extended time" (2005: 3).

as a way of reducing greenhouse gas emissions) that can explain why Vermont's government is not exemplifying characteristics of an HRO.

► Disaster studies: For example, the HRO literature identifies characteristics of effective, safe, and reliable organizations. My research therefore looked for these characteristics within Vermont's state government.

► Organizational theory: For example, concepts such as "bounded rationality" (Simon, 1994 1958]) and "intuition" (Kahneman, 2003) help to explain how a "once-in-history" event like peak oil (Grant, 2007) can slip past the attention of government officials. More broadly, three characteristics of any organizational system–the environment of organizations, organization characteristics, and the cognitive practices of people within organizations (Vaughan, 1999)–encapsulate the range of influences and factors that impact decision-making for good and ill. My research therefore attempts to identify what aspects of the state government's environment, what organization characteristics, and what cognitive practices stand in the way of Vermont's government performing like an HRO.

► Political sociology: For example, the ideology and political platform of the corporate-conservation coalition/Republican Party revolves around a moral order premised on religious values (e.g., anti-abortion), a strong anti-tax, anti-New Deal, 'free market' perspective, and a muscular foreign policy (Domhoff, 1998; Medvetz, 2006). The proposed tax on Vermont Yankee certainly led to the veto of H.520 by Governor Douglas. My research therefore tried to understand what impact dueling political ideologies have on a lack of government reliability in addressing peak oil and climate change.

► Collapse literature: For example, Diamond's (2005) recent best-seller theorizes that past societal collapses may have resulted from a lack of anticipation or perception that problems were upon them. Tainter's (1988) classic work explains that "declining marginal returns" led to previous societal collapses. My research therefore tried to ascertain if government employees were aware of peak oil and climate change, and whether or not they perceived the risk that these problems pose. I also asked about sunk costs and issues such as road and building maintenance to see if Vermont's government could be characterized as experiencing declining marginal returns.

► Environmental sociology: For example, the human exemptionalism paradigm (Dunlap and Catton), the treadmill of production (Schnaiberg and Gould), the risk society (Beck), environmentally significant behavior (Stern), and the concerns-capacities-conditions model (Lutzenhiser) all offer explanations for both a lack of concern about ecological problems and a continuing commitment to creating ecological problems. Alternatively, the thesis of ecological modernization (Mol and Spaargaren) proponents is that a combination of institutional, political, cultural, technical, and economic reforms can avert widespread environmental devastation. My research therefore uses the kernel of each perspective to understand if, for example, concerns, capacities, and conditions are favorable in Vermont's government for reliable action, or, whether the human exemptionalism paradigm constrains reliable action.

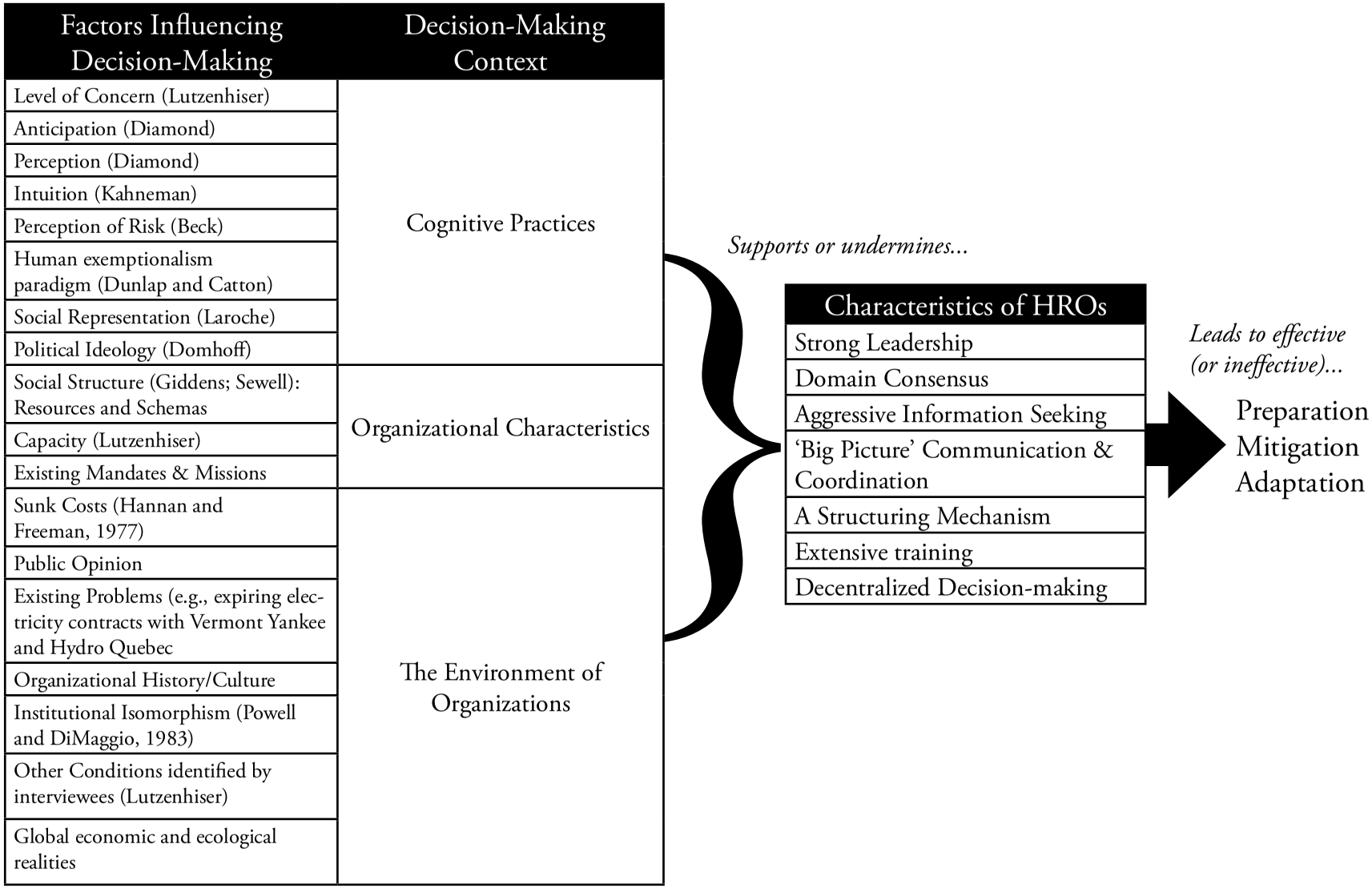
I use a wide range of sources because none of these literatures can satisfactorily answer the questions posed above. For example, the disaster studies literature has focused on accidents, emer-

gencies, disasters, and catastrophes but has yet to broach the possibility of collapse, and has mainly focused on disasters such as earthquakes and floods, rather than ecological problems or resource dependency problems. The disciplinary blinders endemic in mainstream sociology regarding the natural environment have been exhaustively noted by environmental sociologists. Environmental sociology itself has traditionally invoked the human exemptionalism paradigm and the treadmill of production to explain both lack of concern about ecological problems and a continuing commitment to creating ecological problems. It has less frequently invoked concepts such as bounded rationality, intuition, institutional isomorphism, or the absence of HROs and HRNs to explain ecological degradation and government decision-making. My dissertation attempts to weave together these pieces of the puzzle to provide a more robust portrayal of government response to complex socio-ecological problems.

To drive home this point, in the only social science article on peak oil that I have come across, psychologist Lyle Grant's (2007) original work highlights a number of issues that could help to explain an unreliable response to peak oil: Peak oil is not intuitive; there are few comparable experiences that HROs could 'practice' in order to prepare for the event; powerful corporations have a vested interest in denying the concept; people are used to flipping a switch to get energy and, even if they wanted to reduce their fuel usage, contextual and cultural factors frequently stand in the way; a belief that technology will save the day; and social representations–particularly for politicians–can be damaged by the gloomy story of peak oil. That is, his work reaches far and wide to develop a theory of the way people have avoided dealing with peak oil.

The potential factors elucidated by these literatures influence three characteristics–**the environment of organizations**, o**rganizational characteristics,** and **the cognitive practices of individuals within organizations (**Vaughan, 1999)–of any organizational decision-making context (Figure 3). For the duration of this study, I use these characteristics as framing vehicles for identifying and grouping the range of factors that help to explain or disprove my thesis that Vermont's state government is not acting like an HRO. That is, for each characteristic I perform a kind of litmus test, attempting to identify their presence or absence.

Figure 3. General Dissertation Model



Regarding the **cognitive practices of individuals within organizations**, which assumes contexts of bounded rationality, I ask:

- Have government employees anticipated/planned for peak oil and climate change? Anticipation, planning, aggressive information-seeking and 'practice' are characteristics of HROs. I

- Are government employees concerned about peak oil and climate change? Concern is a prerequisite for leadership, communication, aggressive information-seeking and other characteristics of HROs. I am hypothesizing that concern about peak oil and climate change is not widespread within Vermont's state governnment. I am hypothesizing that the state government has not planned for peak oil and climate change and does not have a structuring mechanism or something akin to an ICS for dealing with peak oil and climate change.

- Do government employees perceive climate change and peak oil to be risks to Vermont? A risk or threat is a precursor to aggressive information seeking, training, etc. I am hypothesizing that government employees do not perceive peak oil and climate change to be risks to Vermont.

- Do the concepts of peak oil and climate change seem intuitive to government employees? Are solutions to peak oil and climate change intuitive to interviewees? I am hypothesizing that the concepts and solutions are not intuitive, hence there is no domain consensus, training, etc.

- Do interviewees reveal a belief in the human exemptionalism paradigm? I am hypothesizing that some government employees believe that human ingenuity will solve the peak oil and climate change problems, thus down-playing the risk that they pose and the need for government action.

- Is the government exhibiting clear and effective leadership on peak oil and climate change? I am hypothesizing that the Governor is presenting a social representation of leadership on climate change, rather than leadership as it is described in the HRO literature.

- Does the ideology of the Republican Party, characterized by a strong anti-tax stance and "a general hostility to government and liberalism" (Domhoff, 1998: 4), preclude strong leadership on the part of Governor James Douglas (Republican) in addressing peak oil and climate change? I am hypothesizing that this ideology does stand in the way of developing HRO characteristics in Vermont government regarding peak oil and climate change.

For **organizational characteristics** I ask:

- Do government employees have the resources (human and non-human) and capacities they need to properly address peak oil and climate change? I am hypothesizing that Agencies/Departments do not have the resources or capacities they need to develop a reliable response.

- Is the Agency/Department the interviewee works for concerned about peak oil and climate change? Do existing missions and mandates preclude preparation, mitigation, and adaptation activities on peak oil and climate change? I am hypothesizing that existing work loads, orga-

nizational schemas, and a lack of Agency/Department concern constrain the development of HRO characteristics.

- Are Vermont's Agencies/Departments and government branches coordinating to help the state prepare for, mitigate against, and adapt to peak oil and climate change? Does Vermont's government have a problem coordinating to solve tasks? I am hypothesizing that state government is not coordinating to deal with peak oil and climate change.

For the **environment of organizations** I ask:

- What external and internal conditions impact organizational decision-making? I am hypothesizing that sunk costs, existing problems, organizational history, the treadmill of production, the 'iron cage,' global/local economic and ecological problems and other conditions constrain state government's ability to act reliably.

Taken together, the decision-making context either supports or undermines characteristics of HROs, while the presence or absence of HRO characteristics leads to effective, reliable, and safe (or ineffective, unreliable, and unsafe) preparation, mitigation, and adaptation strategies.

Method to the madness

Chapter four describes my research methodology and operationalization of variable categories. Time limitations and work responsibilities made it impossible for me to pursue a national or comparative study of state government response to peak oil and climate change at the level of detail that I aspired to achieve (e.g., Vermont versus New Hampshire). Likewise, I was unable to spend "9 months of full-time (45+ hr per week) participant observation" studying an organization, which is what Jennifer Howard-Grenville (2006) did for a recent study of organizational decision-making. Nor was it necessary for me to initiate and immerse myself in an unfamiliar setting, as Wacquant (2003) and Duneier (1999) recently did in their acclaimed ethnographies. Rather, I was in the unique position of working for a quasi-governmental organization–the Vermont Sustainable Jobs Fund (VSJF)–during the course of this research project. My position was unique in the sense that I had access to certain kinds of information about government decision-making, based on anecdotes and personal experience that led me to believe that Vermont's state government was not acting reliably to prepare for, mitigate against, and adapt to peak oil and climate change. My experience in this position helped me to purposively select appropriate and knowledgeable interview subjects, based on my interactions with them, my observation of them at meetings and/or conferences, and my knowledge of their re-

sponsibilities. In cases where I did not know the people I wanted to interview, I was fortunate in that my co-workers usually did and were able to facilitate access. My position was awkward in the sense that I had to avoid getting myself and the organization in hot water by asking questions that could potentially embarrass government employees, including those employees that control VSJF's state appropriation.

I sought out three types of interviewees: 1) people within Agencies and Departments who I believed, based on my observations, were *the* employees responsible for environmental, energy, and climate change related issues; 2) the Secretaries of Agencies and the Commissioners or Deputy Commissioners of Departments who would give the official position of their respective organization (I interviewed four out of six Agency Secretaries, missing only the Agency of Administration and the Agency of Human Services); and 3) members of nonprofit organizations that interact with state government on energy, environmental, or climate related issues. I had originally intended to interview Legislators, the Governor and the Lieutenant Governor. A few Legislators were interviewed, but I had a difficult time arranging interviews with others that I approached. My dissertation is also limited to the extent that I was unable to interview the Governor and Lieutenant Governor. Alternatively, I used public documents (press releases and news articles) that quoted them directly in order to reflect their views on peak oil and climate change.

During the course of twenty-six semi-structured, in-depth interviews with informants from Agencies, Departments, the Legislature, as well as nonprofits that interact with Vermont's government, I asked questions about the decision-making context of Vermont's state government and the presence/absence of HRO characteristics.

"...What we create everyday is a dull tool."

Chapter five analyzes the results of my interviews with Vermont government personnel. My research puts the two preeminent ecological problems of our time–peak oil and climate change–front and center in a governmental decision-making context. Even though sub-national forces such as states have taken the lead on preparing for, mitigating against, and adapting their citizens to peak oil and climate change, several questions regarding state responses are unresolved. For example, under

what conditions can a state, like Vermont, have low emissions and "high policy" (Raab, 2007a) but still not act to prepare for, mitigate against, or adapt its citizens to peak oil and climate change? What lessons can be learned from the experiences of low emissions/high policy states? Why aren't state governments acting more like high reliably organizations (Ginter et al., 2006; Drabek, 2005; Bigley and Roberts, 2001; Roberts and Bea, 2001; Bierly and Spender, 1995) in addressing peak oil and climate change? What barriers stand in the way of reliability? What sociological factors can help to explain variation in state responses?

Drawing from sociology and environmental sociology literatures, I hypothesized that the absence of concern, anticipation, perception, intuition, the presence of the human exemptionalism paradigm, and political ideology helped to explain the absence of strong leadership, domain consensus, aggressive information seeking, 'big picture' communication and coordination, a structuring mechanism that mobilizes people to address peak oil and climate change, extensive training, and decentralized decision-making. I hypothesized that Agencies/Departments do not have the resources or capacities they need to develop a reliable response to peak oil and climate change, especially due to existing mandates, programs, and cultural schemas such as a belief that government is part of the problem, not part of the solution. I hypothesized that sunk costs (what Joseph Tainter refers to as 'declining marginal returns'), existing problems and programs, organizational histories, the 'iron cage' of bureaucracy, global/local economic and ecological problems and other conditions constrain state government's ability to act reliably.

My thesis was largely borne out over the course of interviews with twenty-one high ranking government employees, as well as five nonprofit employees. Despite being the "greenest state in the country," Vermont creates, in the words of one interviewee, "a dull tool," for dealing with problems. Except for domain consensus that climate change is a problem, the majority of the characteristics of HROs are not apparent in Vermont's response to peak oil and climate change.

► **Strong Leadership:** The presence of domain consensus (e.g., concern, awareness, anticipation, perception, and intuition) that climate change poses a risk to Vermont helps to explain instances of governmental leadership. However, the Governor's social representation of leadership on climate

change is not believed by nonprofit or staff-level interviewees. The cleavage or disconnect between the official representation of leadership (i.e., all Agency Secretaries believe the Governor and the Agencies are providing leadership) and the "peasant" view of leadership (i.e., none of the nonprofit or staff-level interviewees feel the Administration is providing leadership) is accentuated by political ideology. Most staff level interviewees, the two legislators interviewed and all nonprofit employees believe that the Administration is incompetent, are frustrated at the Governor's policy preferences, have the sense that Republicans disdain government, and appear to have very little respect for the Governor and his Cabinet. The Governor's Administration, on the other hand, feels that the Legislature is ignoring the Governor's views and policy/program preferences. Despite being the "greenest state in the country," Vermont's state government has not advanced an ecological modernization agenda. The state government's most far-reaching attempt to pass ecological modernization legislation (H.520) was stopped by treadmill of production/power elite forces that encouraged the Governor to veto the bill.

Organizational characteristics of the Legislature, the Governor's cabinet, and Agencies/Departments enabled and constrained the ability of each to provide leadership on climate change: the Legislature is providing leadership on climate change but does not have the bully pulpit; the Governor has the bully pulpit, but the "bubble" of the executive branch is viewed as divisive and clueless; staff-level employees are not viewed as leaders and lack resources, are already occupied with current mandates or commitments to long-standing problems, or are not specifically tasked with addressing climate change. A wide range of external and internal factors have encouraged the Governor and Legislature to show leadership on climate change, but some of these factors have also discouraged leadership, as was the case with the State of Vermont's most far-reaching attempt to date at advancing an ecological modernization agenda (i.e., H.520).

In sharp contrast to climate change, the social representation of leadership on peak oil is virtually non-existent, with many interviewees feeling that addressing climate change takes care of peak oil. A few interviewees were unclear on the peaking date and consequently felt that it is not a short-term problem, and there were no organizational 'champions' pushing for action on peak oil. No state Agency or Department is providing leadership in preparing for, mitigating against, or help-

ing Vermonters adapt to peak oil. Finally, external events have elevated concern about peak oil, but that concern has not translated into instances of governmental leadership. In fact, one incident (the Governor's appearance on a radio show where he admitted not knowing what peak oil meant), is conspiratorially portrayed by some interviewees as a reason for why the Governor has not provided leadership on the problem.

► **Domain Consensus:** Personal and organizational concern has led to one characteristic of HROs: domain consensus that climate change is a problem. Every interviewee was familiar with the concept of climate change and considered it a risk. However, personal, staff-level concern, awareness, or perception about climate change or resource depletion has not historically led to organizational action, even though interviewees believed that they had a means of sharing their concerns with supervisors. Rather, it appears to be the case that major policy shifts on energy and climate coincided with external events (e.g., the oil embargo and New England Governors and Eastern Canadian Premiers conference), suggesting that decentralized decision-making is not a characteristic of Vermont's government. Personal concern about peak oil was mixed and caveated. For example, most interviewees considered climate change to be the bigger problem, a few were unclear on the peaking date and consequently felt that it is not a short-term problem requiring attention, while others frequently conflated peak oil and climate change as the same problem.

Administrative and Legislative consensus that climate change is a problem has led to the Climate Neutral Working Group, the Governor's Commissioner on Climate Change, and H.520, all of which have been characterized by lack of reliability. Consensus that climate change pose risks to Vermont has not been matched with resources, capacities, expertise, etc., to match the scale of the risks. The first sign of an emerging consensus on peak oil or liquid fuel consumption was the all heating fuels efficiency utility that was to be created by H.520. No state Agency or Department is tasked with addressing peak oil, and even if domain consensus that climate change and peak oil are problems and organizational forms for addressing both were in place, it is still the case that government interviewees are overwhelmed by existing problems, conditions, and priorities.

► **Big Picture Communication and Coordination:** Confusing mandates, the compartmentalization of activities, and the lack of any kind of planning or coordinating entity that provides leadership to address peak oil and climate change chokes up lines of communication. The presence of official representations of leadership and domain consensus that at least climate change is a problem did not seem to improve lines of communication or coordination within state government. The ability to communicate and coordinate more effectively is constrained by internal and external sources of inertia, including confusing mandates, risk aversion, legitimacy constraints (or the quest for legitimacy), and competition for budget allocations.

► **Aggressive Information Seeking:** All interviewees were aware of climate change and most had detailed knowledge about peak oil. All interviewees perceived that climate change and peak oil pose risks to Vermont, especially over the long-term. Anticipation on the part of government employees that climate change and resource shortages/peak oil could pose problems for Vermont does not appear to have led to aggressive information seeking, planning, coordination, etc. Rather, outside forces–the oil embargo, participation in the New England Governors and Eastern Canadian Premiers conference–appear to have triggered state government reaction. Now that climate change and, to a lesser extent, resource shortages/peak oil are on the table, the Department of Buildings and General Services did recently attempt to identify state government energy consumption and emission data, the Department of Public Service is holding public meetings on Vermont's energy future in October 2007, and the Center for Climate Strategies (the consultant hired to facilitate the Governor's Commission on Climate Change) collected emission information and calculated stabilization wedges. Even with anticipation that climate change and peak oil pose problems, state government personnel appear to have been caught off-guard by the rapid emergence of these issues.

► **A Structuring Mechanism (e.g., ICS):** Vermont has a nascent structuring mechanism in the form of the Climate Neutral Working Group and possibly the Center for Climate Change and Waste Reduction, as well as a temporary mechanism in the Governor's Commission on Climate Change. However, significant communication problems (including canceled and irregular meetings), lack of domain consensus, a sense that some of the reports utilized were whitewashed, turf issues

around which Agency/Department is responsible for which activity, a limited budget, and coordination problems have impacted the effectiveness of the CNWG. There is no structuring mechanism for coordinating response to peak oil.

► **Extensive Training:** Contrary to Diamond's hypothesis [2005], it will not be a lack of anticipation and perception that dooms today's societies. Almost all interviewees anticipated and perceived climate change and peak oil to be risks in the short-term, while all of them perceived both to be problems in the long-term. This concern has translated to recent planning efforts to address climate change that have been marked by communication, coordination, and funding problems. No planning efforts to address peak oil have developed yet. At the same time, the difference between peak oil and climate change–and the solutions to each–were frequently not intuitive to interviewees. State employees frequently turn to colleagues in other Agencies and Departments for assistance, but communication and coordination on peak oil and climate change is quite limited and fragmented, and resources are constrained at every Agency and Department.

► **Decentralized Decision-making:** Although personal concern, anticipation, and perception about climate change were widespread, they did not appear to lead to organizational concern or to consistent, reliable Agency/Department planning, even though all interviewees suggested that it was possible in each Agency or Department to share their concerns with supervisors. It appears that domain consensus about problems needs to come from the Governor or Legislature, even though staff-level employees may be more knowledgeable than their supervisors. The lack of decentralized decision-making presents a real problem, especially to the extent that frequent turnover in senior management can derail momentum since time is required to renew trust, re-establish priorities, and put out fires.

"...We're in a stage where state government doesn't know the answer."

Chapter six concludes with observations and recommendations for future action. Although the details of this dissertation are specific to Vermont, the problems are likely endemic in other U.S. states and other forms of government. The argument advanced here is that, although we know everything we need to know about a whole suite of wedges that can reduce oil consumption and green-

house gas emissions (e.g., renewable energy, conservation), the decision making context of governments–the cognitive practices of individuals, organizational characteristics, and the environment of organizations–currently does not support the characteristics of a reliable response.

This finding is not as sexy as, say, the latest promotion of cellulosic ethanol, algal biodiesel, hybrid cars, and other renewable energy projects to solve our problems. And it does not present the same rosy sheen as the latest pronouncement of "greenness." Rather, as state governments learn, shift gears, and recalibrate their activities to address the twin challenges of peak oil and climate change, it is important to recognize that the veneer of "greenness," "high policy," official representations of leadership, and technological infatuation may mask underlying unreliable structures.

The problems of peak oil, climate change, and unreliable responses to both have implications for sociology and society. Global climate change has the potential to transform ecological arrangements, including increasing temperature, altering weather patterns (e.g., an increase in the frequency and severity of hurricanes), changing the composition of local plants and animals and the suitability of crops, etc. It also has the potential to directly impact social arrangements, through increased insurance rates, the spread of tropical diseases, growing heat-related deaths, etc. Peak oil means that the supply of readily available oil and oil-related products will decrease. Together, global climate change and peak oil call into question how we live, where we live, what we can do, where we can go and what we study. The job of the sociologist, in this context, is to prevent ecological ruin and societal collapse from happening by illuminating problems in the decision-making context and developing the capacity for reliability in all types of organizations.

2. Why are Peak Oil and Climate Change Unprecedented Problems?

"Since the middle of this century the social institutions of industrial society have been confronted with the historically unprecedented possibility of the destruction through decision-making of all life on this planet…Protection diminishes as the danger grows. There is no social order that could guarantee its social and political constitution in this worst possible case. There are many, however, which are specialized in the only remaining possibility: denying the dangers…Political stability in risk societies is the stability of not thinking about things."

Ulrich Beck, *From Industrial Society to the Risk Society: Questions of Survival, Social Structure and Ecological Enlightenment*, 1992

The world has ended many times, in many places, for many societies. The mystery of ruins has appealed to countless tourists, scientists, and Indiana Jones wannabes, and inspired a variety of theories that aim to explain why formerly thriving societies collapsed. Why had the inhabitants of Rapa Nui resorted to cannibalism by the time Dutch sailors made contact in 1722? Why did the architects and astronomers of Chaco Canyon disperse? What does the collapse[9] of past civilizations have to do with the sustainability of modern societies?

Many scholars have converged on three major causal factors undermining past civilizations: human societies can overshoot the carrying capacity of their ecosystems by (1) **depleting natural resources** while simultaneously (2) **degrading ecosystems** (e.g., deforestation). Past societies experiencing sudden and prolonged (3) **climatic events**, such as droughts, face the possibility of collapse, and climate changes that intersect with resource depletion and ecosystem degradation increase the possibility of collapse (Good and Reuveny, 2006; Diamond, 2005; Fagan, 2004; Janssen and Scheffer, 2004; Thompson, 2004; Wilkinson, 2004; Weiss and Bradley, 2002; Chew, 2001; De Menocal, 2001; Fernandez-Armesto, 2001; Tainter, 2000, 1996, 1988; Eisenberg, 1998; Rosa and Dietz, 1998; Ponting, 1991; Catton, 1982; Hughes, 1975).

Today, on land, sea, and in the air, the signs of global resource depletion, massive ecosystem degradation, and anthropogenic climate change are everywhere:

► The United Nations recent *Millennium Ecosystem Assessment Synthesis Report*, subtitled *Our Human Planet* (2006), revealed that people are transforming ecosystems throughout the world at a faster

9 The geographer and historian Joseph Tainter defines collapse as "a rapid, significant loss of an established level of sociopolitical complexity" (1988: 4). Biogeographer Jared Diamond characterizes collapse as "a drastic decrease in human population size and/or political/economic/social complexity, over a considerable area, for an extended time" (2005: 3).

and more extensive pace than any other time in human history. Of particular significance, this compilation of expertise from more than 2,000 authors and reviewers finds that 60 percent (15 out of 24) of the major ecosystems examined are being used unsustainably; the changes being made to these ecosystems are increasing the likelihood of "nonlinear" changes (e.g., the emergence of diseases and unpredictable events); and poor people are disproportionately being impacted by the harmful effects of ecosystem degradation.

► A somewhat dated set of calculations found that humans appropriate nearly 40 percent of potential terrestrial productivity, or 25 percent of combined potential global terrestrial and aquatic net primary production (Vitousek et al., 1986: 372). More recent calculations by Vitousek et al. (1997) estimate that between one-third and one-half of Earth's land surface has been impacted by human activity, while about half of all accessible fresh water is being used.

► Using "ecological footprint" analyses—an estimation of how much land and water area is required to continuously produce all the goods that we consume and to assimilate all the wastes that we generate—Wackernagel and Rees report that "The present Ecological Footprint of a typical North American (10-12 acres) represents three times his/her fair share of the Earth's bounty" (1995: 13). Rees explains that modern industrialized countries are running massive "ecological deficits" with the rest of the world–that is, they are appropriating the carrying capacity of "land vastly larger than the areas they physically occupy" (1995: 351). In fact, if everyone in the world shared the consumptive lifestyles of North Americans, the nonprofit Redefining Progress reports that four additional Earths would be necessary (www.redefiningprogress.org).

► A recent study in the journal *Science* concludes that "marine biodiversity loss is increasingly impairing the ocean's capacity to provide food, maintain water quality, and recover from perturbations" (Worm et al., 2006: 787). If overharvesting trends continue, the study's authors report, all taxa of fish currently harvested may collapse by 2048. A *National Geographic* special report states "The oceans are in deep blue trouble. From the northernmost reaches of the Greenland Sea to the swirl of the Antarctic Circle, we are gutting our seas of fish. Since 1900, many species may have declined by nearly 90 percent, and it's getting worse" (2007: 37). The 2006 edition of the United Nations *Global Environmental Outlook* identifies nearly 150 oxygen-starved "dead zones" in the world's oceans and seas–linked to nutrient runoff from farms and other industrial emissions and wastes–which threaten the survival of aquatic life.

► According to the United Nations' Millennium Ecosystem Assessment, "The global area of naturally regenerating forest has declined throughout human history and has halved over the past three centuries" (2006a: 31). Although temperate and boreal forests are on the rebound after "severe deforestation" in North America, Europe and North Asia, deforestation continues to roll through the world's tropical forests, where most of the world's terrestrial biodiversity comes from. There was a total net decrease in global forest area from 1990 to 2000 estimated at over 23 million acres per year. That's about the area of five Vermonts per year.

► In 1998, scientists in Antarctica drilled the deepest ice core recorded and found that carbon dioxide and methane levels are higher now than they have ever been in the past 420,000 years (Petit et al., 1999: 433). The Third Assessment Report (TAR) of the Intergovernmental Panel on Climate

Change (IPCC) pushes that level back to 650,000 years and asserts with "very high confidence" that the activities of humans have increased greenhouse gas emissions (e.g., carbon dioxide, methane, nitrous oxide) and warmed the surface of the planet (2007: 3). This increase in greenhouse gases is transforming ecosystems by altering Earth's climate: melting glaciers and ice sheets are raising ocean levels, changing weather patterns (e.g., increasing the frequency and severity of hurricanes, see Emmanuel, 2005), and changing the composition of local plants and animals (i.e., pushing many species to extinction, see Kolbert, 2006; Flannery, 2005). The United States alone could lose over 20,000 square miles of coastal land with a one meter (39 inches) rise in sea levels (Titus and Richmond, 2001). The second volume of the TAR, published in April 2007, warns that climate change puts many species on the "highway to extinction" and makes it clear that poorer nations, especially in Africa, will disproportionately suffer the impacts of climate change.

► The well-known "Hirsch Report" suggests that "The peaking of world oil production presents the U.S. and the world with an *unprecedented* risk management problem" (2005: 4; my emphasis). Peak oil is the point in time in which half of the oil that exists has been removed from the Earth. Peak oil is not the end of oil, but rather the end of cheap and easy to reach oil. Oil is the key energy resource used around the world, accounting for one-third of all energy consumed (GAO, 2007: 9). A recent U.S. Government Accountability Office (GAO) report, citing the International Energy Agency, says that "most countries outside the Middle East have reached their peak in conventional oil production, or will do so in the near future" (2007: 7). The largest oil field of America's second largest source of oil imports–Mexico's Cantarell–has recently gone into decline (Malkin, 2007) and the largest field in the world, Saudi Arabia's Ghawar, also appears to be in decline (Simmons, 2005; Roberts, 2004). The GAO report points out that "U.S. consumers paid $38 billion more for gasoline in the first 6 months of 2006 than they paid in the same period of 2005, and $57 billion more than they paid in the same period of 2004, in large part because of rising oil prices, which reached a 24-year high in 2006 when adjusted for inflation" (2007: 1).

The problems of global peak oil and global climate change, in particular, are unprecedented because they are implicated in three of the main factors that have led to previous societal collapses, only at a much larger scale: every ecosystem and social system will be impacted. Peak oil and global climate change both have their roots in fossil fuel dependency and energy consumption. The combustion of fossil fuels to power societal development and the clearing of forests for housing and development has also increased the global mean surface temperature of the planet by about 1° Fahrenheit over the 20th century. Everything that gets described as civilization occurred over the past 15,000 years, during a warm period known as the Holocene, or "long summer" (Fagan, 2004). Every sector of the global economy has been converted to fossil fuel dependency over the past 200 years. Anthropogenic climate change could spell the end of the long summer, while peak oil calls into question the progress of the past 200 years. The plea advanced by a small number of social scien-

tists–that energy should be taken seriously since it is "fundamental to social organization and a central factor in society-environment interactions" (Lutzenhiser et al., 2001: 223)–may finally be answered as societies confront rising gas prices and temperatures, eroding coastlines, bleaching coral reefs, and melting glaciers. The ability to prepare for, mitigate against, and adapt to peak oil and climate change is going to be a major challenge for all segments of society.

Human Ecology

Understanding how human societies created the problems of peak oil and climate change (i.e., how we have expropriated and used energy) is crucial to avoiding worst case scenarios such as collapse. The field of environmental sociology has focused on the fact that human societies necessarily exploit surrounding ecosystems in order to survive, but societies that flourish to the extent of overexploiting the ecosystem may destroy the basis of their own survival. The field has been concerned with trying to answer two overarching questions:

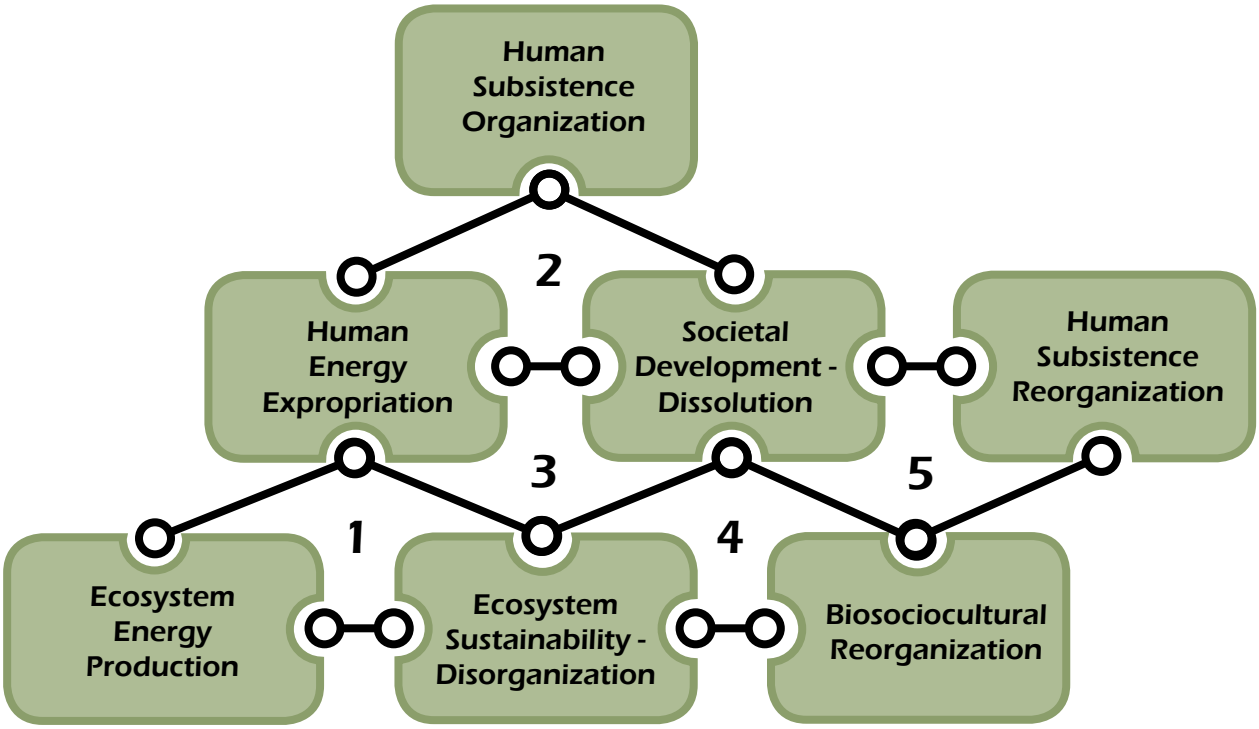
- How do interdependent variations in human population, technologies, cultures, social systems, and 'personality systems' (or social psychology) influence the natural environment?
- How do resultant changes (and other non-anthropogenic variations) in the natural environment modify human populations, technologies, cultures, social systems, and personality systems, or any of the interactions among them? (Dunlap and Catton, 1979: 252; Buttel, 1976).

Lee Freese's illuminating theoretical work (1988a, 1988b, 1994, 1995, 1997a, 1997b) on human ecology sets the stage for answering these two questions. His model for the *evolution of biosociocultural regimes* starts with the proposition that "energy flows through ecosystems into sociocultural systems as the fundamental stuff of life support" (1997b: 84). "Process Assembly" 1 in Figure 3 describes the relationship between ecosystem energy production to variable rates of human energy expropriation. Depending on the level of energy expropriation, ecosystem integrity is either sustainably maintained or disorganized.

Process Assembly 2 describes the relationship between energy expropriation, subsistence organization, and development. As Smil (1994) and many others have documented, human energy expropriation lays the foundation for increasing complexity in human subsistence organization (e.g., the transition from hunting and gathering to agricultural production to industrialization). In other

words, increases in energy expropriation are interrelated with increased technological complexity, rising population (e.g., due to increased food availability and decreased mortality), and divisions of labor, leading to more complex societies. Conversely, and in line with Tainter's theory of societal collapse, societies that reduce energy expropriation–for whatever reason–face the possibility of dissolution.

Figure 4. A Qualitative Model for the Evolution of Biosociocultural Regimes



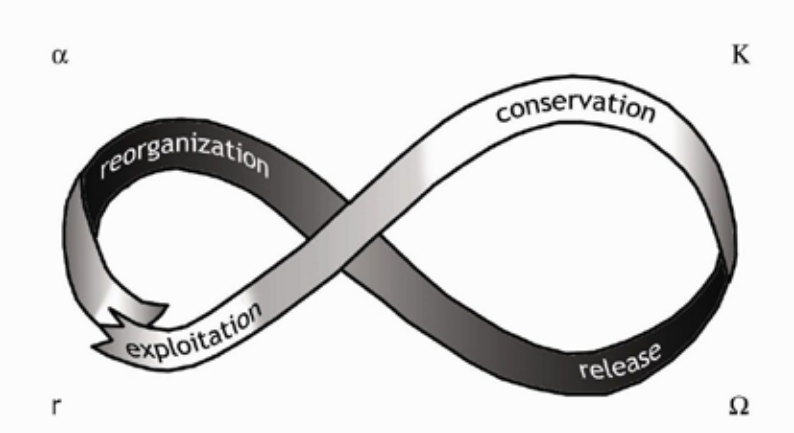
Source: Freese, 1997a.

Process Assembly 3 generally comes into play when a society develops beyond the hunting and gathering phase, when the intensification of production for subsistence "tests" the carrying capacity of the particular ecosystems sustaining them. Disorganized ecosystems can reduce the amount of energy available to societies and make the likelihood of their collapse more likely. Processes 4 and 5 reflect a reorganization of social systems and ecosystems in tandem, based on levels of ecosystem energy production, energy expropriation, societal development, and ecosystem disorganization. Freese summarizes our modern predicament in the context of his model as follows: "To not live within real biophysical carry capacity in effect is to not live within sustainable ecological means, which is to say, to live in ways that nature's evolutionary design does not permanently enable" (1997b: 214).

Panarchy

A model called "panarchy"[10] adds a layer of dynamism and helps to explain the status of each of the green boxes in Figure 3. A panarchy is a set of "adaptive cycles" nested or linked at progressively larger scales. Adaptive cycles are models of how social systems and ecosystems develop, collapse, and reorganize (Gunderson and Holling, 2002). In the panarchy model, the "r phase" refers, for example, to the colonization of recently disturbed areas in ecosystems or open competition in markets in social systems. The front-loop stage, from r to K, represents the slow, incremental phase of growth, accumulation and development (e.g., of forests, Microsoft and bureaucracies). In this stage, winners expand, grow, and accumulate potential from resources acquired (e.g., the Republican party) or ecosystems accumulate and store energy and material. As the system evolves to the "K phase" or conservation phase, connectivity among the survivors intensifies, and new species find it difficult to enter the ecosystem or entrepreneurs find it difficult to enter existing markets (Figure 4).

Figure 5. Adaptive Cycle



Source: Gunderson and Holling, 2002.

The tightly bound accumulation of biomass and nutrients or social relations in the K phase becomes increasingly fragile until suddenly released by agents (Ω) such as forest fires, insect pests, wars or social movements. It is in the K to Ω phase that the panarchy theorists say that all systems become accidents waiting to happen. The back-loop phase, from Ω to α, represents an increase in uncertainty and danger, as well as opportunity, renewal and surprise. One implication of this model

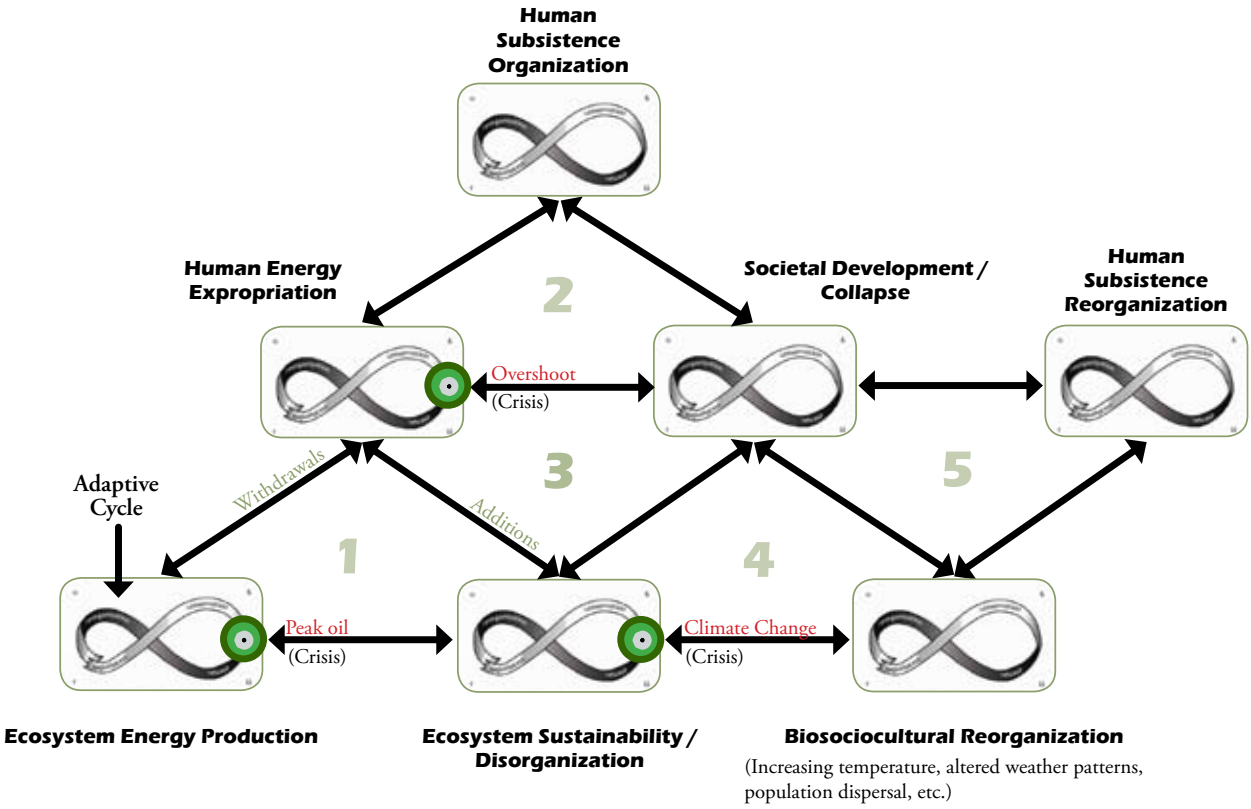
10 Url: http://www.resalliance.org

is that change in one adaptive cycle can cascade through whole panarchies, leading to novelty or catastrophe. In the example of Vermont, which uses the least energy and emits the least amount of greenhouse gas emissions of any state, the panarchy model opens the door to the possibility that innovative changes here could influence other locations.

Similar to disaster studies researcher's concern about the reliability of organizational decision-makers, panarchy scholars are concerned with the resiliency of social-ecological systems. Resiliency refers to maintaining system integrity in the midst of disturbance, and the ultimate goal of resilience management is to "prevent the system from moving to undesired system configurations" and to "nurture and preserve the elements that enable the system to renew and reorganize itself following a massive change" (Walker et al., 2002). Identifying "thresholds", particularly prior to the turbulent K to Ω phase, is key to preparing for, mitigating against, and adapting to disturbances.

Adaptive Cycles and Biosociocultural Regimes

Figure 6. Lee Freese's Model with Adaptive Cycles



Replacing each of the green boxes in Freese's model with adaptive cycles (Figure 5) gives a fuller sense of the predicament that organizations responsible for solving problems are faced with. With regards to Process Assembly 1, thresholds appear to have been crossed and each adaptive cycle is in its K to Ω phase:

- **Ecosystem energy production: peak oil.** Oil reservoirs formed over hundreds of millions of years. The first oil boom began in 1859 in Pennsylvania. In the 148 years since, humans have become utterly dependent on fossil fuels, particularly oil, for energy and a large range of other uses. World oil production is predicted to peak in the near future.

- **Human energy expropriation: overshot carrying capacity.** The litany of problems identified on Pages 19-20 provide evidence that a series of thresholds have been passed or have the potential of being passed, particularly with more than 6 billion humans on the planet.

- **Ecosystem sustainability/disorganization: climate change.** Atmospheric carbon dioxide levels have gone from approximately 270 parts per million prior to industrialization to nearly 400 parts per million currently and rising.

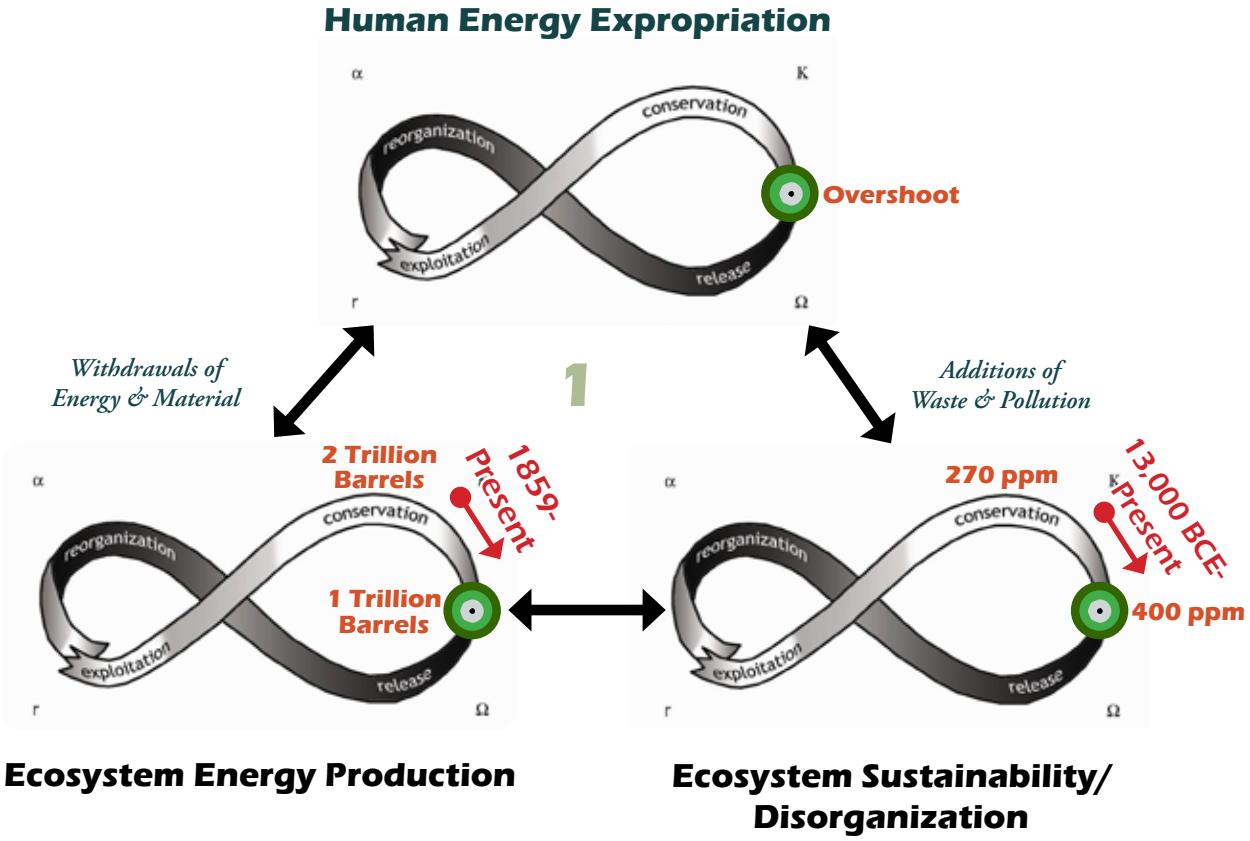
The rest of this chapter cycles through Freese's model, indicating how human actions have altered ecosystems and how ecosystems have impacted human societies. Particular emphasis is placed on oil expropriation, societal development based on oil expropriation, ecosystem degradation resulting from oil expropriation, and the implications for societal sustainability based on declining oil reserves and climate change.

2.1. Ecosystem Energy Production

Energy in the form of sunlight drives photosynthesis in plants, which purifies the air, helps to regulate climate and provides food for life forms on Earth. Human societies convert ecosystem energy flows into resources such as food, shelter and energy, and to power a wide range of other activities. Human societies depended on *renewable*, solar powered biomass for fuel, shelter, tools, and other items for most of human history. While humans have always impacted (e.g., through the use of fire) the particular natural ecosystems that sustain them (Hughes, 1975; Cronon, 1992 [1983]; Diamond, 1997; Chew, 2001; Fernandez-Armesto, 2001), it is commonly written that the advent of agriculture and the domestication of plants and animals between 10,000 to 12,000 years ago fundamentally altered human interactions with natural ecosystems (White, Jr. 1974; Catton, 1982; Shepard, 1982;

Ponting, 1991; Diamond, 1997; Eisenberg, 1998; Fernandez-Armesto, 2001). While biomass provided concentrated solar energy for heat, lighting, and cooking, the concentration of energy in the form of food crops and animals (i.e., calories from food) provided sustenance that led to the development of settled, politically centralized, socially stratified, economically complex, technologically innovative societies in a few locations (Diamond, 1997).

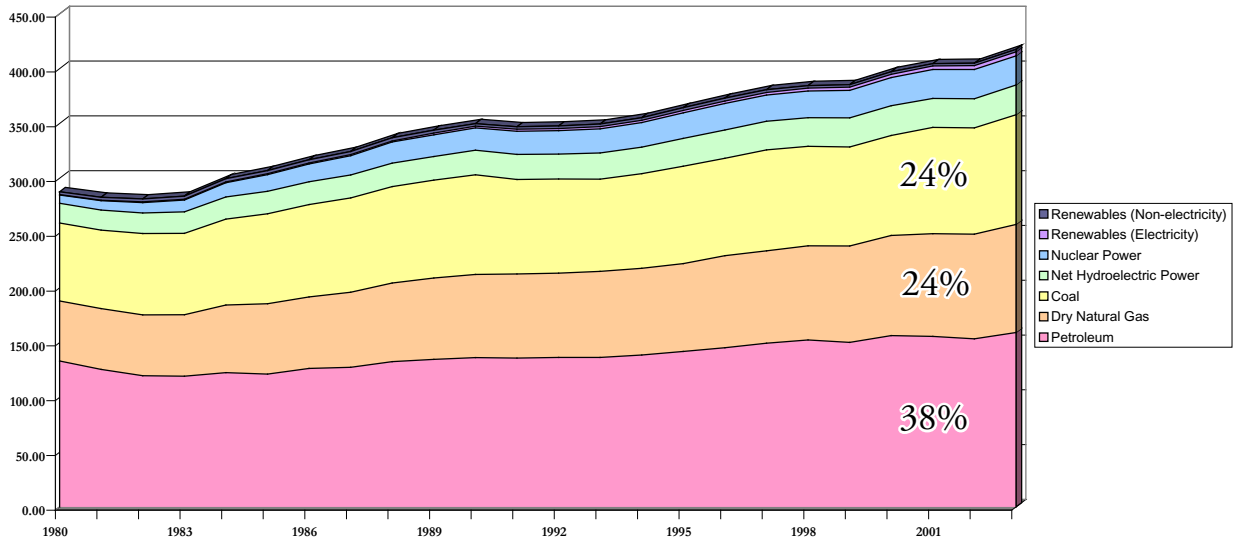
Figure 7. Process 1: Production - Expropriation - Sustainability/Disorganization



In contrast to sunlight and biomass, fossil fuels—oil, natural gas and coal—are a onetime endowment of nonrenewable resources. The conditions under which oil and natural gas were formed were quite specific: In terms of the ecosystem energy production adaptive cycle (Figure 6), chlorophyll-filled plants and sea creatures *exploited* land and water ecosystems hundreds of millions of years ago. The remains of these plants and creatures settled at the bottoms of ancient oceans, swamps, rivers, lakes, etc., where they was buried and *conserved* in porous rocks 7,500 to 15,000 below the ground and covered with a leak-tight seal in order to turn into petroleum. As a result, "Oilfields

cover less than 0.1 percent of the continents and continental shelves" (Deffeyes, 2005: 17).[11] Peak oil proponents such as M. King Hubbert (1976), Kenneth Deffeyes (2005) and Colin Campbell (2002) think Earth's total endowment of oil is slightly more than 2 trillion barrels. Industry proponents such as ExxonMobil think this figure is closer to 4 trillion barrels of oil, but there are reasons to be skeptical about their claims (Campbell and Laherrere, 1998). With the drilling of oil in Pennsylvania 148 years ago, humans became the disturbance or change agent (Ω) *releasing* petroleum from its underground tomb. In the brief interim since then, peak oil proponents believe one trillion barrels of oil have been pumped out of the ground. Since petroleum is a non-renewable resource, requiring long time-spans to develop, there will not be any kind of *reorganization* or regeneration of this energy source in a time-frame meaningful to humans.

Figure 8. Total World Energy Production by Source, 1980-2003



Source: Energy Information Administration

In the 200 years since the Industrial Revolution (late 1700s to the mid 1800s), virtually ever society on the planet has become dependent on *non-renewable* fossil fuels for everything from electricity and fuel to agriculture and plastics. The harnessing of fossil energy power, especially oil, radically changed the trajectories of human societies (Yergin, 1991; Smil, 1994). Figure 7 shows the scale

11 Coal is more prolific and supplies are expected to last for several hundred years. Natural gas production in the United States has also peaked.

of societal dependency on fossil fuels. Fossil fuels are versatile, have a high return on investment, and are packed with power. Together, fossil fuels accounted for about 86 percent of the energy produced in the world in 2003. Petroleum alone accounted for a little more than 38 percent of the total energy generated in the world in 2003. Hydroelectric dams and nuclear reactors each account for a little more than 6 percent of world energy generation, while renewable electricity and fuels each account for less than 1 percent of the total. A Btu (British thermal unit) is the amount of energy required to rise the temperature of one pound of water by one degree Fahrenheit. A quadrillion is a one followed by 24 zeros. The United States alone accounts for a little more than 18 percent of the energy produced in the world. That is, as a percentage of world total, the United States produces more energy than every *continent* except Asia (which produced a little more than 23 percent of the total). U.S. energy production has only grown by about 5 percent from 1980 to 2003, while U.S. energy consumption has grown more than 26 percent during the same time period. As will be shown shortly, the gap between production and consumption is made up through imports. Vermont has no fossil fuel resources and consequently relies on imports.

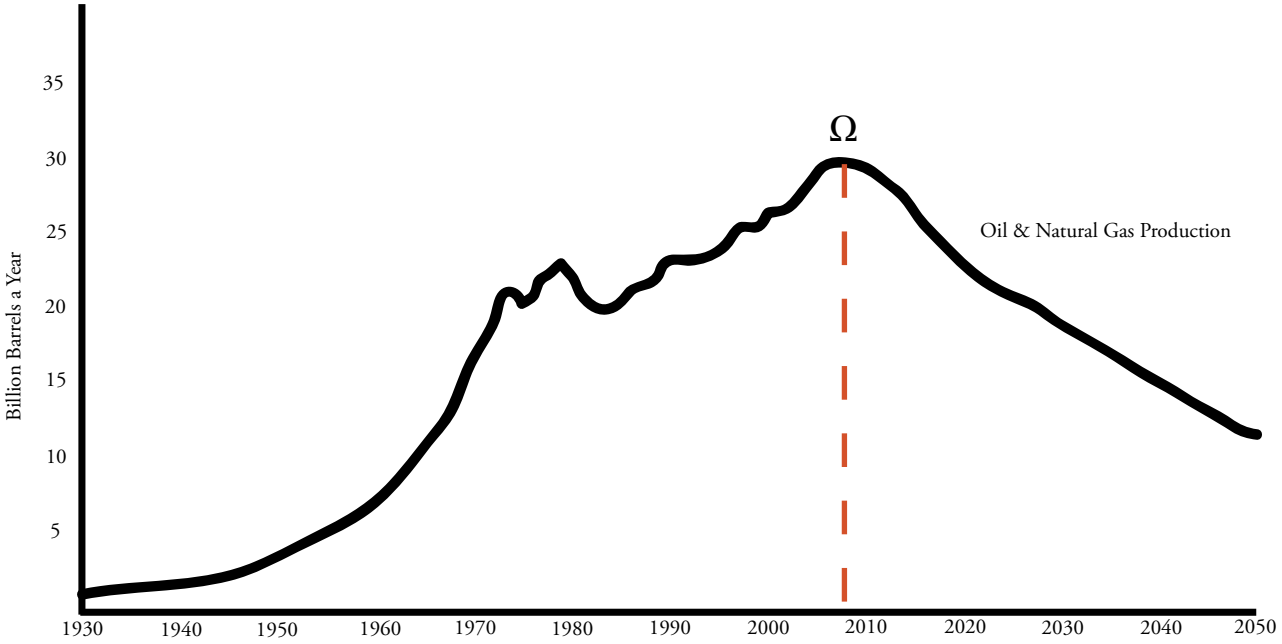
Peak Oil

Peak oil is the point in time in which half of the oil that exists has been removed from the earth. Peak oil is not the end of oil, but rather the end of cheap and easy to reach oil. Peak oil means that the supply of readily available oil and oil-related products will decrease. Oil geologist M. King Hubbert was peak oil's Paul Revere. In 1956 he predicted that U.S. oil production would peak around 1970 (it did). His calculations were based on the well-known bell curve: "If we knew the quantity initially present, we could draw a family of possible production curves, all of which would exhibit the common property of beginning and ending at zero, and encompassing an area equal to or less than the original quantity" (1956: 9-11). Hubbert described the peaking of oil production as "a national problem of primary importance" (1956: 27).

U.S. oil discovery peaked in the 1930s, followed by a production peak forty years later. Global oil discovery peaked in the 1960s and global production peak is predicted to occur sometime between now and 2016 (Heinberg, 2004: 18-19), but some scholars such as Deffeyes think it has already oc-

curred. Figure 9, adapted from an Association for the Study of Peak Oil chart shows real data up to the early 2000s, followed by a hypothetical decline.

Figure 9. Peak Oil



Based on Association for the Study of Peak Oil chart.

Peak oil has implications for how we live, where we live, what we can do and where we can go. The *Hirsch Report* describes peak oil as a classic risk management problem: If peaking is delayed, then mitigation efforts may have been premature. Alternatively, "If peaking is imminent, failure to initiate timely mitigation could be extremely damaging" (2005: 6). In either case, the *Report* recommends that risk management should begin well in advance of peaking. The emerging literature on peak oil is overwhelmingly apocalyptic (Grant, 2007; Deffeyes, 2005; Heinberg, 2005; Hirsch et al., 2005; Kunstler, 2005; Simmons, 2005; Roberts, 2004; Campbell and Laherrere, 1998). In *The Long Emergency*, James Kunstler predicts a future with severe losses "in population, in life expectancies, in standards of living, in the retention of knowledge and technology, and in decent behavior" (2005: 5). The *Hirsch Report* states that "Intervention by governments will be required, because the economic and social implications of oil peaking would otherwise be chaotic" (2005: 5). Unfortunately, the GAO report finds that "according to DOE [Department of Energy], there is no formal strategy for coordinating and prioritizing federal efforts dealing with peak oil issues, either within DOE or between

DOE and other key agencies" (2007: 6).

With regards to Process Assembly 1, the implications of declining oil supplies are significant for human energy expropriation, namely, less energy will be available for human uses. Ecosystem sustainability in this case has less to do with the impacts of oil extraction or the familiar instances of oil spills. Rather, the combustion of fossil fuels has released stored carbon and other gases into the atmosphere, warming the planet and upsetting the balance of ecosystems.

2.2. Human Energy Expropriation

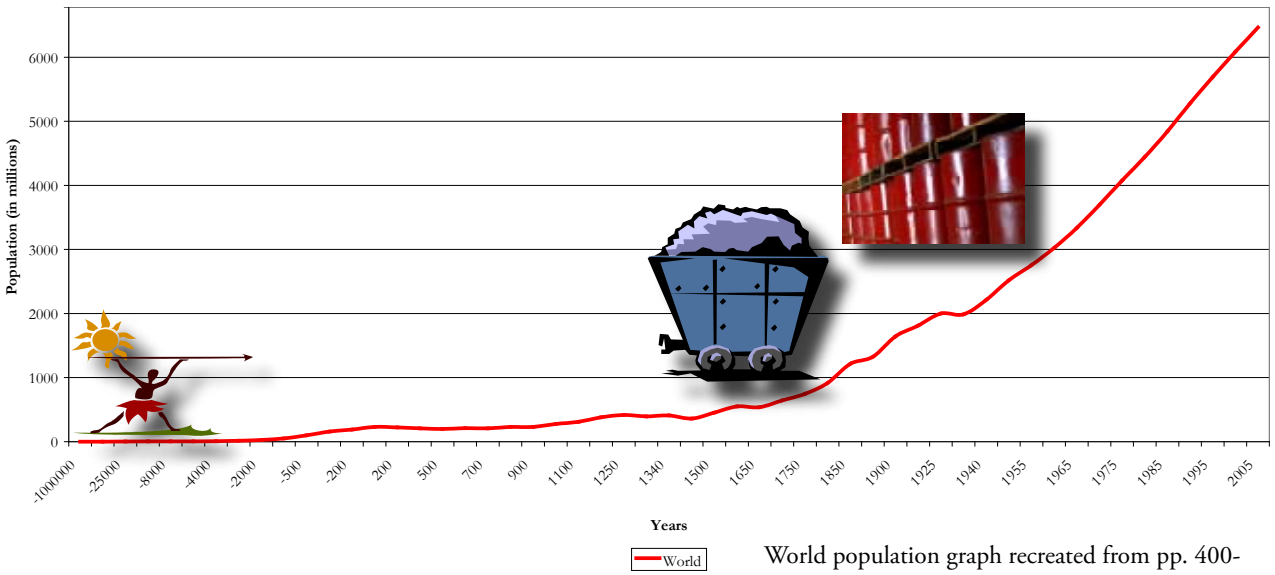
Overshoot

Martinez-Alier (1987), Fischer-Kowalski (1998, 1999), and Foster (2001) all make the case that an economics and sociology based on the flow of energy and materials through societies could have been established many decades ago if the works of Wilhelm Ostwald, Marx and Engels, Frederick Soddy, Sir Patrick Geddes, Serhii Podolinsky, Eduard Sacher, Lewis Mumford, Howard Odum, Fred Cottrell and others had been seriously considered by social scientists. At the heart of an energetic view of societal development is the thesis that "the energy available to man (sic) limits what he (sic) can do and influences what he (sic) *will* do" (1955: 2). In his historical overview of energy, Smil argues that "Civilization's advances can be seen as a quest for higher energy use converted into increased food harvests and greater mobilization of materials (1994: 223). Odum and Odum go one step further, writing that "the laws of energy control the human patterns, economics, times of growth, and time of levelling" (1981: 3).

For the majority of human existence we lived in small bands and subsisted by gathering plants and hunting animals, that is, our ancestors depended on renewable biomass for fuel, food, tools, and other items for most of human history. With the domestication of certain plants and animals between 10,000 and 12,000 years ago, our population grew. However, it took the harnessing of fossil energy power—first coal and then oil—for world population to top 1 billion around 1900. Since then, world population has skyrocketed with an additional 5 billion people (Figure 10). In the 200 years since the Industrial Revolution, virtually ever society on the planet has become dependent

on non-renewable fossil fuels for everything from electricity and fuel to agriculture and plastics. The harnessing of fossil energy power, especially oil, radically changed the trajectories of human societies.

Figure 10. Human Population



World population graph recreated from pp. 400-401 in Cohen, Joel E. 1995. *How Many People Can the Earth Support?* New York: W.W. Norton.

Anthropologist Richard Adams argued that "control over stocks and flows of energy provides people and organizations with the ability to exercise social power" (cited in Lutzenhiser et al., 2001: 225), but the ability to expropriate energy has been sharply uneven from the starting block. Jared Diamond's 1997 classic, *Guns, Germs, and Steel*, examined natural inequalities between Eurasia and the rest of the world to understand modern day inequality. For example, the Fertile Crescent region has the largest Mediterranean climate zone in world, had 32 of the world's best 56 wild grasses used for agriculture, and the wild ancestors of thirteen of the fourteen big animals domesticated before the twentieth century roamed Eurasia and nowhere else. These natural fortunes in turn led to the major agents of conquest described by Diamond–steel swords, guns, ocean-going ships, political organization, writing, and epidemic diseases–that enabled Europeans to defeat Native Americans, Africans, and Australian Aborigines. Although societal collapses in North and South America, Africa, and Australia due to climate change, resource depletion, and ecosystem degradation took place prior to European arrival, it was the original concentration of energy in the form of agriculture that enabled Europeans

to introduce continent-wide collapses of indigenous populations in North America, South America and Australia.

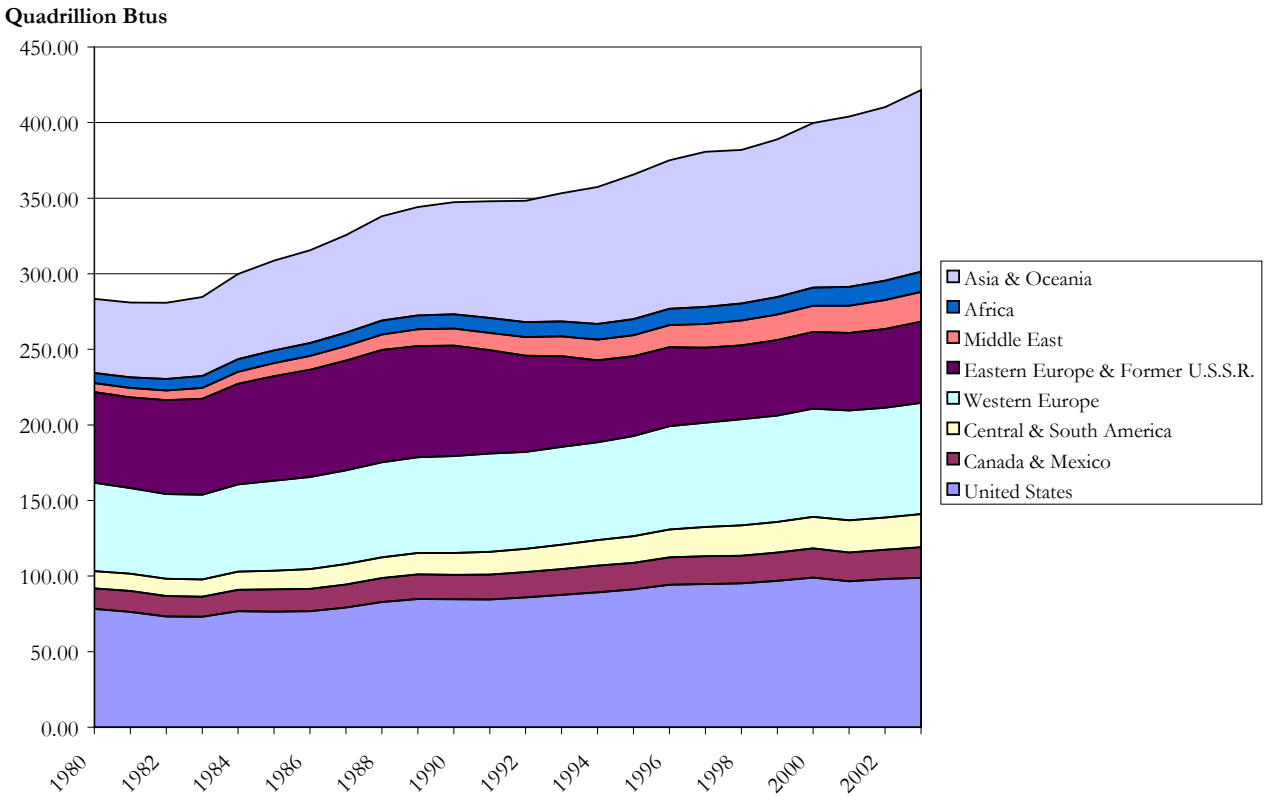
World Systems theorists such as Roberts and Grimes (1997) explain that the current world economy took on its defining features during the period of conquest between 1500 and 1650 and that unequal interactions between poorer 'peripheral' nations and those of the rich 'core' were founded in colonization, conquest, and collapse. Throughout history, Europeans and their descendants have accumulated and controlled resources by appropriating land and labor and by controlling the movement of indigenous peoples while simultaneously attempting to eliminate indigenous cultural systems (Taylor, 2000: 533).

The West, and particularly the United States, secured its power and influence throughout the 20th Century by securing increasing amounts of energy. Oil was known about prior to the first Pennsylvania well was drilled in 1859. A substance called bitumen seeped up through cracks in the ground and was used a building material, for heat, and as a weapon (Yergin, 1991: 23). Yergin explains that three great themes underlie human expropriation of oil. The first is that, from a very early date, with the rise of John Rockefeller's Standard Oil, oil has been synonymous with the development of capitalism and modern business. "Oil", Yergin states, "is the world's biggest and most pervasive business" (1991: 13). The second main theme is that oil is intertwined with national development strategies and global politics (1991: 13). In particular, America's exploitation of its oil reserves was instrumental in defeating Japan and Germany in World War II. The Cold War was not only about ideological supremacy, the United States and the former Soviet Union competed for control of Middle Eastern oil. Several sources make the argument that, in the aftermath of the Cold War, resource wars are the new battlefronts (Klare, 2002; Klare et al., 2004). The third major theme is that the conversion of oil to energy really brought about a new kind of civilization, with advancements in electricity and lighting, automobility, housing (i.e., suburbanization), agriculture (i.e., fertilizer), plastics and chemicals changing the way we spent our days, how we got around, how and where we lived, how we raised our food, and how we made things (1991: 14; cf. Smil, 1994: 237).

Figure 8 indicated that fossil fuels, particularly oil, made up the lion's share of world energy consumption. Figures 11 through 18 transition from world energy consumption to U.S. energy consumption to New England energy consumption to Vermont energy consumption. The trendline in each case indicates increasing expropriation of energy.

World Energy Consumption

Figure 11. Total World Energy Consumption by Region, 1980-2003



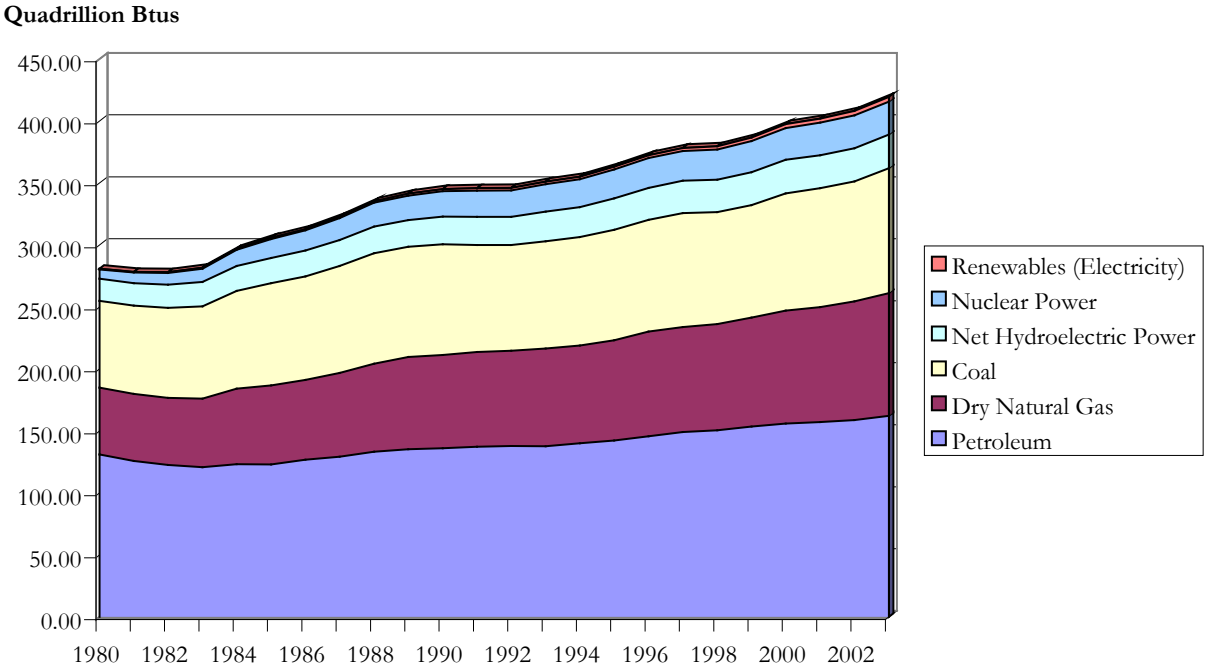
Source: Energy Information Administration

Figure 11 shows that the United States alone consumes more energy than every continent except Asia (23 percent or about 100 quadrillion Btus in 2003). The rate of growth of energy consumption in the United States exceeds the rate of growth of national energy production: The U.S. consumed 28 quadrillion more Btus of energy than it produced in 2003. From 1980 to 2003, U.S. energy consumption increased 26 percent, while Asian consumption increased 145 percent during the same time period. The rate of growth of energy consumption in China and India now exceeds the rate of growth of national energy production (54 quadrillion Btus). One plausible scenario is that the

U.S. will increasingly compete with China and India over diminishing Organization of Petroleum Exporting Countries (OPEC) and former USSR reserves. Only Eastern Europe and the former Soviet Union saw a decrease (-10 percent) in their energy consumption, largely due to the disintegration of the Soviet Union (Zaslavskaia, 2006).

Figure 12 shows the obvious correlation between the consumption of the energy produced in Figure 8.

Figure 12. Total World Energy Consumption by Source, 1980-2003



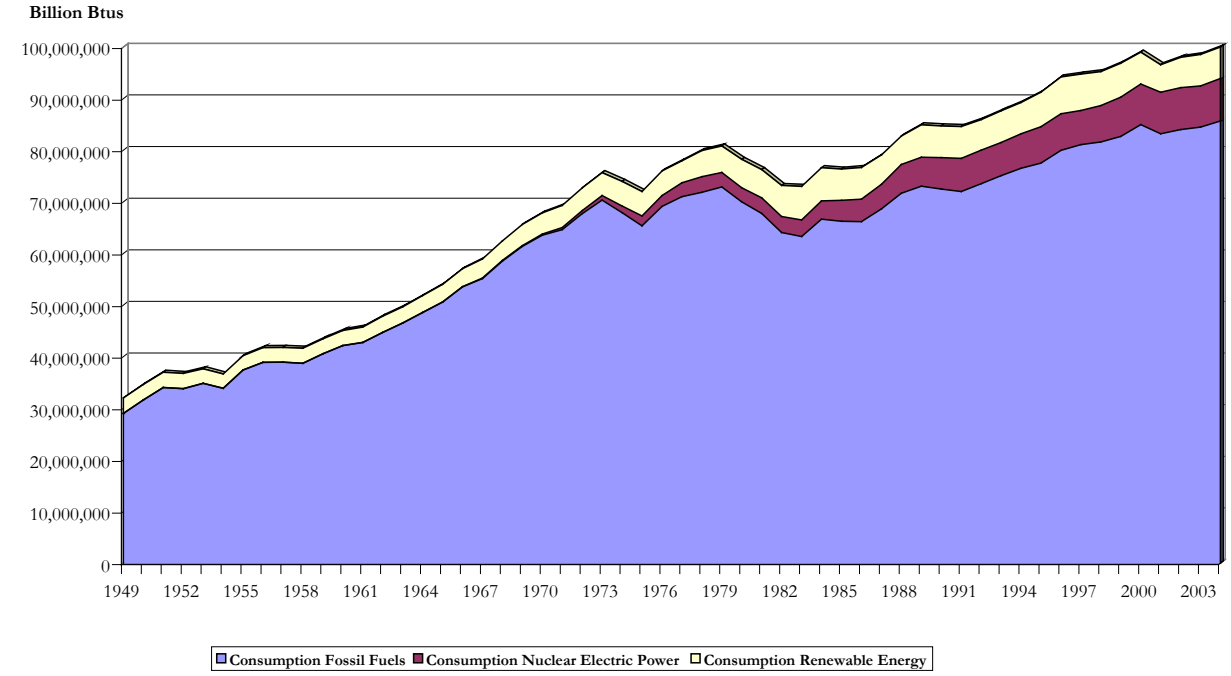
Source: Energy Information Administration

U.S. Energy Consumption

Fossil fuel consumption constituted 86 percent (about 86 quadrillion Btus) of total U.S. energy consumption in 2004 (Figure 13). From 1949 to 2004 U.S. energy consumption increased 212 percent. While U.S. refineries produce over 90 percent of the gasoline and diesel used in this country, an increasing portion (nearly 30 percent) of the crude oil itself comes from other parts of the world. This is due to the fact that U.S. petroleum production peaked in the early 1970s (Figure 14). The United States currently gets about 60 percent of its oil imports from non-OPEC countries (e.g., Canada and Mexico), but it is projected to be the case that the members of the OPEC—Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, and

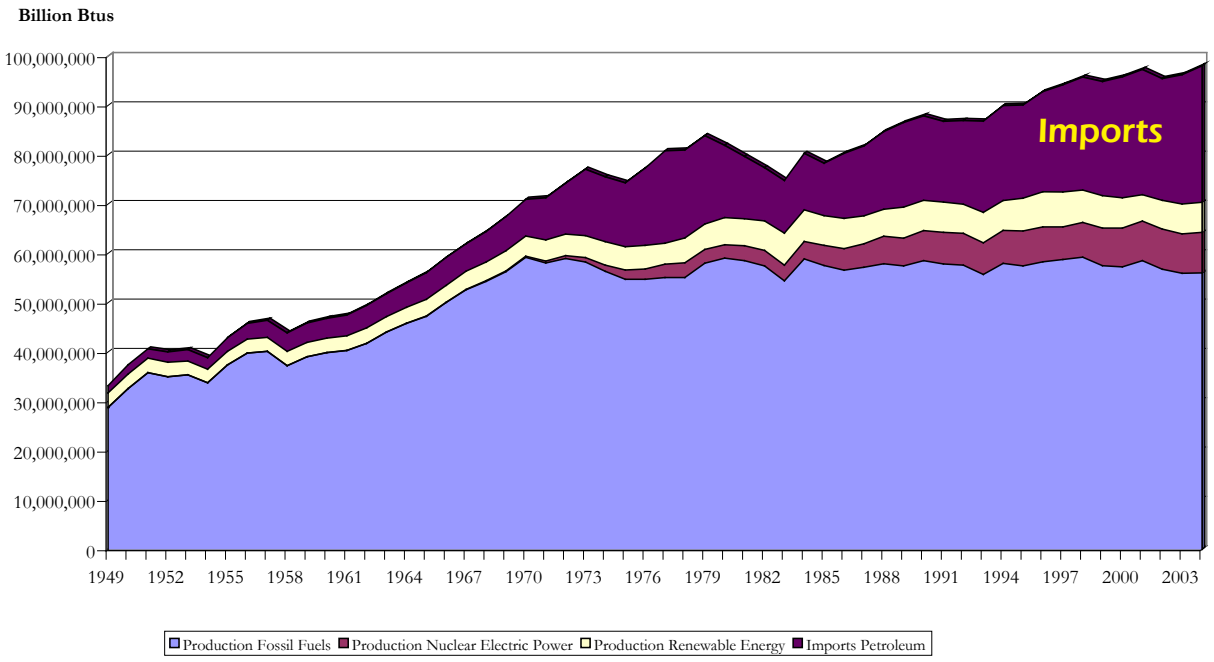
Venezuela—will increasingly account for world crude oil production. In fact, crude oil production among the members of the Organization for Economic Cooperation and Development—American allies—has stagnated.

Figure 13. U.S. Energy Consumption by Source, 1980-2004



Source: Energy Information Administration

Figure 14. U.S. Energy Production by Source, 1980-2004

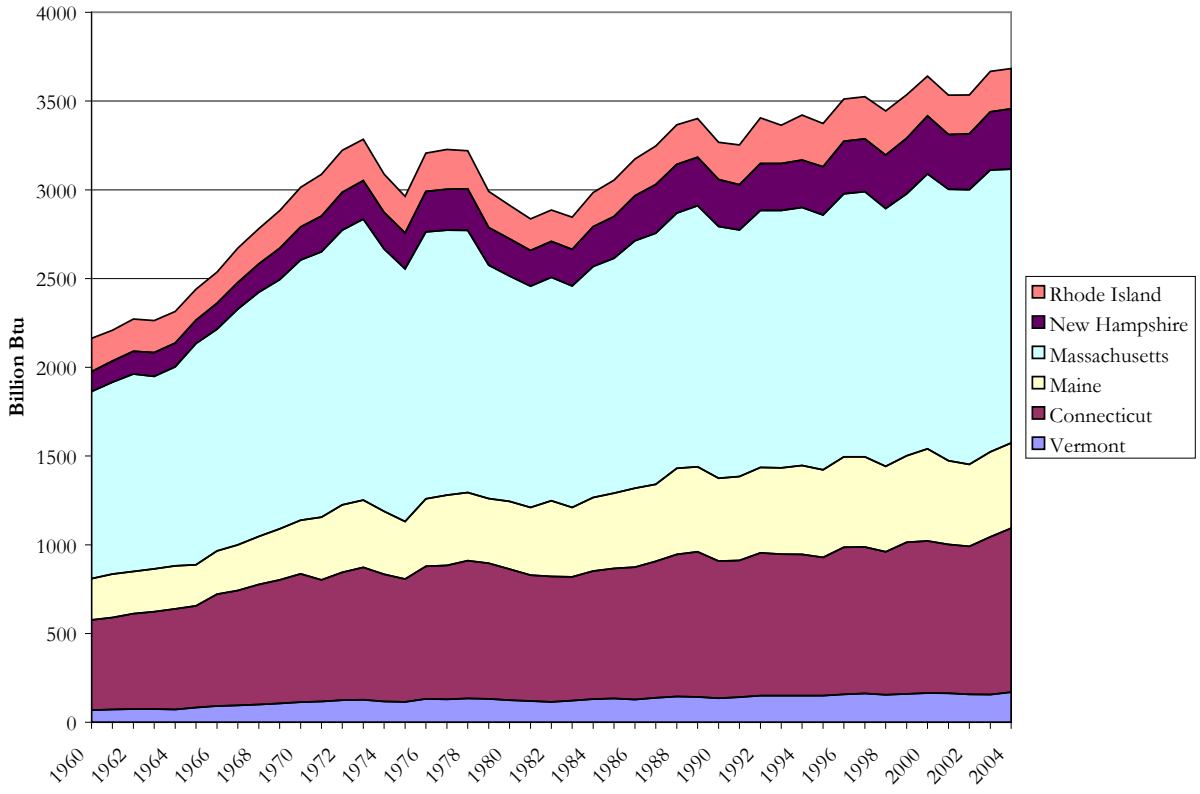


Source: Energy Information Administration

New England's Energy Consumption

Figures 15 through 17 show New England energy consumption. The six New England states account for about 4 percent of total energy consumed and about 5 percent of the petroleum consumed in America. New England also consumes about over 10 percent of the nation's biomass converted into electricity and heating. In 2004, Massachusetts consumed 44 percent of the energy in New England. Vermont consumes the least amount of energy in New England- a little more than 4 percent of the total (Figure 15). Vermont's energy consumption has increased about 41 percent from 1960 to 2004. Rhode Island (an 83 percent increase) and Massachusetts (68 percent) had the largest energy increases, while New Hampshire had the lowest increase (33 percent).

Figure 15. Total New England Energy Consumption, 1960-2004

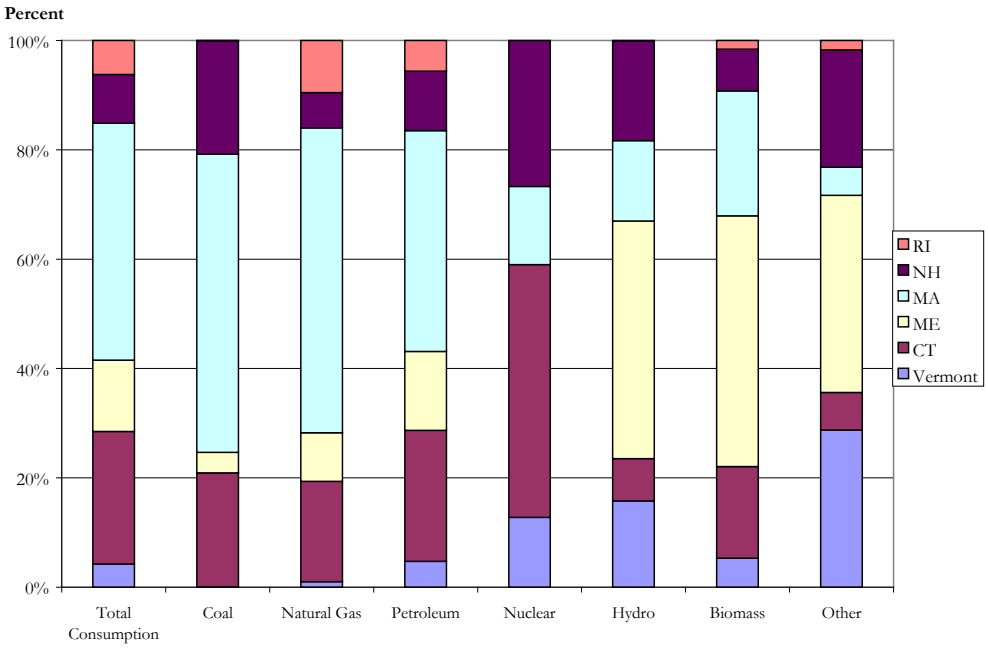


Source: Energy Information Administration

The largest chunk of energy consumed in New England, about 49 percent come from petroleum, mainly for transportation (Figure 16). Of the New England states, Vermont is the only one with no electricity generated from coal, and a very limited amount from natural gas. Within New

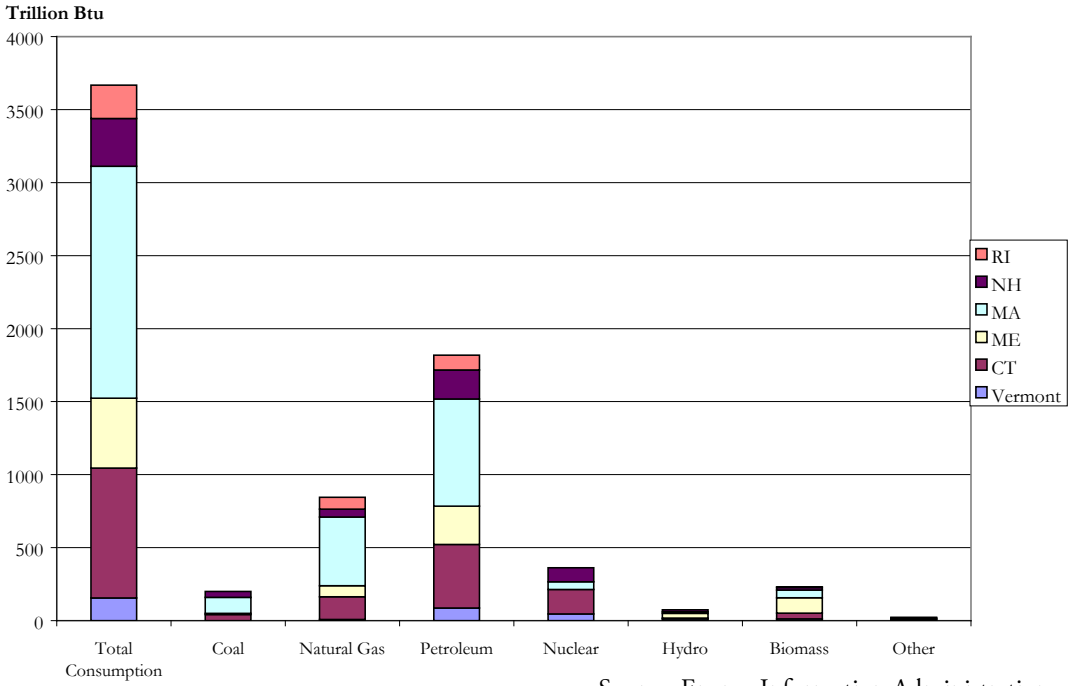
England, Vermont consumes the largest amount of 'other' energy sources (39 percent), namely wind power (Figure 16). However, Figure 17 shows that, in the big picture, this 'other' amount is nearly invisible.

Figure 16. Percent New England Energy Consumption, by Source, 1960-2003



Source: Energy Information Administration

Figure 17. Total New England Energy Consumption, by Source, 1960-2003



Source: Energy Information Administration

Vermont's Energy Expropriation

According to the Energy Information Administration, in 2004 Vermont consumes the *least* energy (about 157.6 trillion Btus of any state in the nation- lower than even the District of Columbia. This is equal to about .16 percent of the energy consumed in the United States.

Table 1. Total Energy Consumption in VT, 2003

Sector	Total	US Rank
Residential	47.0	48
Commercial	31.2	51
Industrial	25.9	50
Transportation	51.7	50
Total	155.8	51

Source: Energy Information Administration.
Units = trillion Btus. Includes District of Columbia

As Table 1 indicates, the largest chunk of energy used in Vermont is for transportation, followed by residential electricity and heating. Vermont uses the least energy of any State in nearly every sector.

On a per capita basis, however, Vermonters actually ranked 45th in energy consumption in 2003 (approximately 253 million Btus). This means that Vermonters are using more energy than might be expected for a state with such a small population. In particular, the residential and transportation sectors use more energy than might be expected, indicating poorly insulated houses, a reliance on oil for heating, and long commutes.

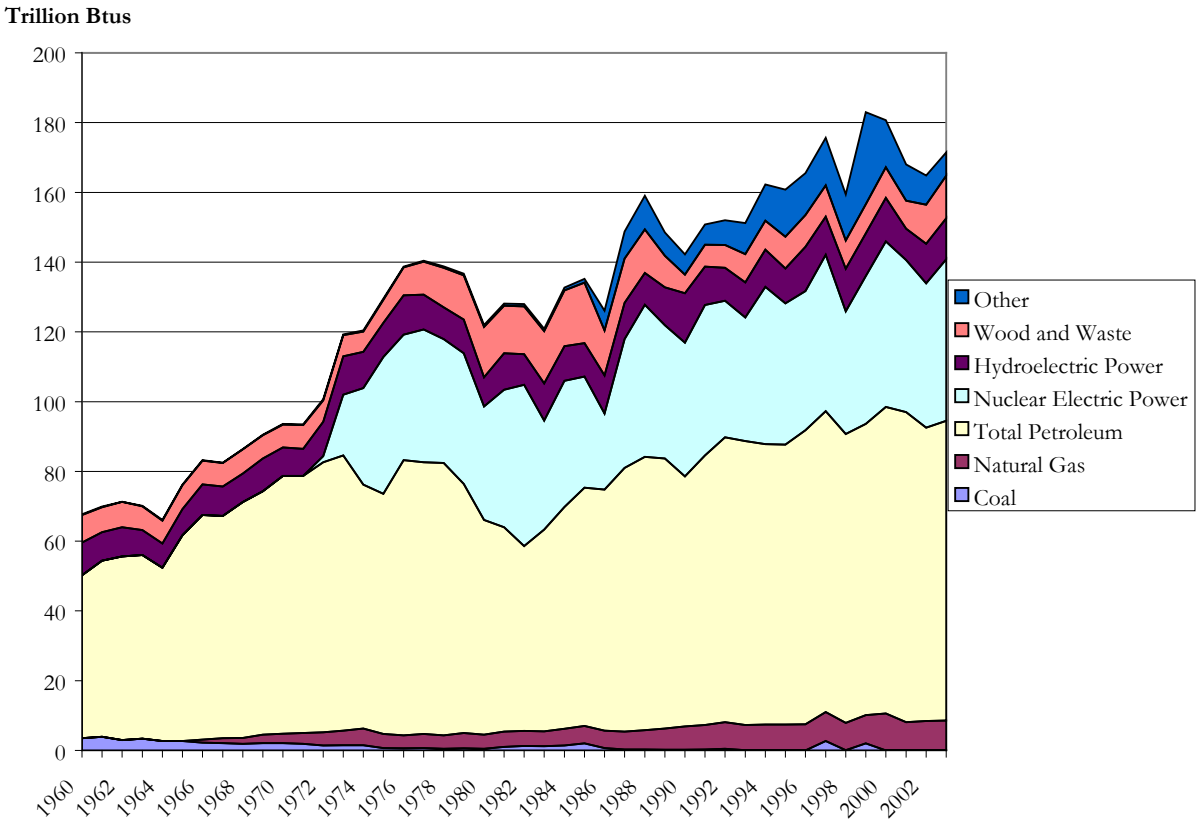
Table 2. Per Capita Energy Consumption in VT, 2003

Sector	Per Capita	US Rank
Residential	76,306,320	35
Commercial	50,654,408	48
Industrial	42,049,653	43
Transportation	83,936,951	34
Total	252,947,332	45

Source: Energy Information Administration
Units = million Btus. Includes District of Columbia

Figure 18 shows Vermont's energy consumption by source. The largest segment—the yellow portion—is petroleum (85.9 trillion Btus, equal to 685,062,000 gallons and 55 percent of the total in 2003) used for transportation sector and heating, followed by nuclear energy (46.3 trillion Btus, 29 percent), hydroelectric energy (11.8 trillion Btus), biomass (12.2 trillion Btus) for electricity, natural gas (8.5 trillion Btus) and virtually no coal.

Figure 18. Vermont's Total Energy Consumption by Source, 1960-2003



Source: Energy Information Administration, State Energy Data. Other includes wind, solar, and geothermal.

Vermont is unique in the sense that most of it's electrical generation comes from nuclear power, hydroelectric power, and from biomass, in other words, from nearly carbon neutral energy sources. As Table 3 and Figure 18 demonstrate, **Vermont's fossil fuel dependency refers specifically to transportation and building heating**. By extension, Vermont's contribution to global climate change come directly from transportation and home heating.

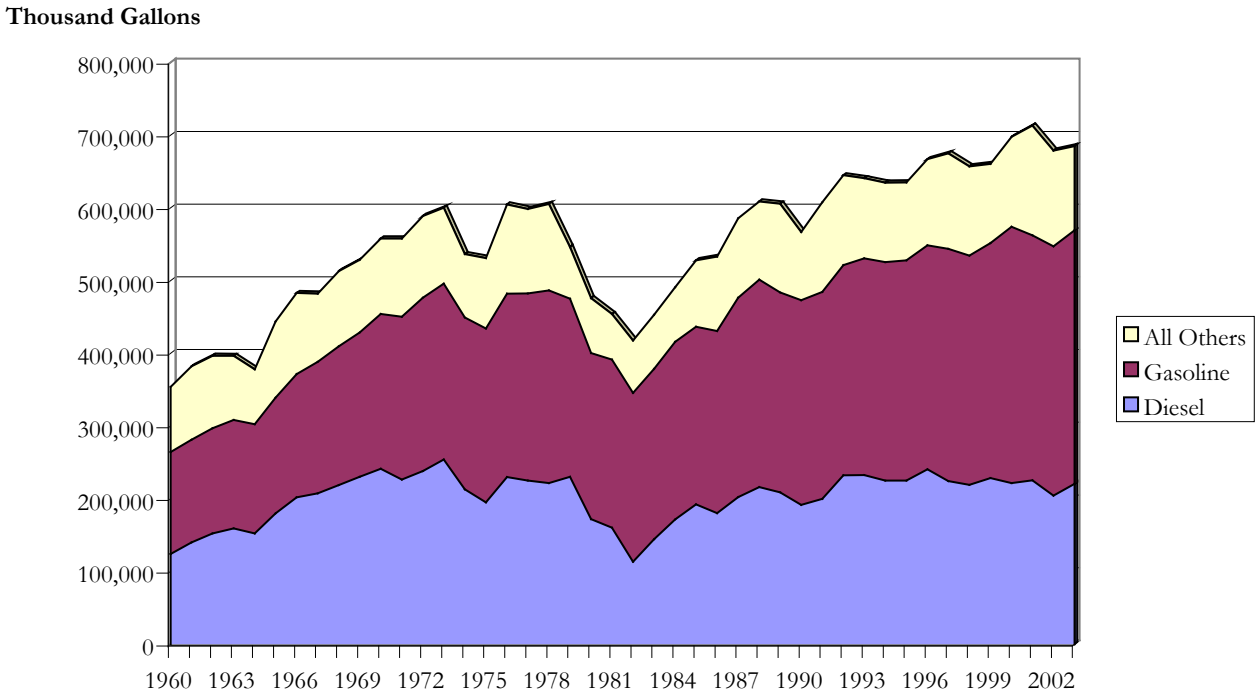
Table 3. VT's Liquid Fuel Consumption, by Sector, 2003

Sector	Gallons	Percent of Total
Residential	169,764,000	24.8%
Commercial	57,960,000	8.5%
Industrial	46,158,000	6.7%
Transportation	408,786,000	59.7%
Electricity	2,394,000	.3%
Total	685,062,000	100%

Source: Energy Information Administration, State Energy Data.

Transportation is the largest consumer of petroleum in Vermont, accounting for about 60 percent of total consumption. The residential sector is the second biggest user, reflecting fuel used for home heating (Table 3).

Figure 19. Vermont's Liquid Fuel Consumption, by Fuel Type, 1960-2003



Source: Energy Information Administration, State Energy Data

Vermont has no fossil fuel resources and receives heating oil, gasoline and other fuels from terminals, or racks, in Springfield, MA, Boston, Portsmouth, NH, Portland, ME, Montreal, and Albany, NY. Petroleum consumption in Vermont has ebbed and flowed based on world events (e.g., OPEC embargoes, recessions), but the general trend is increasing consumption (Figure 19).

In 2003, Vermonters consumed a total 685,062,000 gallons of petroleum (or .22 percent of total American consumption), which ranks 50th in the United States for total petroleum consumption. Of this total, 348,768,000 gallons were gasoline (51 percent of liquid fuel consumption), 220,542,000 gallons were diesel (32 percent of liquid fuel consumption), and 115,752,000 gallons were of all other sources, including aviation gasoline, jet fuel, "residual fuel", kerosene, liquefied petroleum gases, lubricants, asphalt, road oil, and other petroleum products (17 percent of liquid fuel consumption).

Vermonters spend as much on imported petroleum and hydroelectricity each year as the entire State of Vermont's budget- about $1.5 billion. Costs associated with Vermont Yankee and market purchases push the amount of money leaking out of state each year for energy well over $1.5 billion.

The money that Vermonters (and other Americans) spend on fuel goes to the largest and most profitable corporations in the world. *Fortune Magazine* reports that ten of the largest corporations in the world are fossil fuel based companies or, in the case of Wal-Mart Stores, depend on cheap fuel. Six of the ten most profitable companies in the world are also oil companies.

This section on human energy expropriation reviewed official government data to reveal a substantial global dependence on a non-renewable resource for energy. In every instance except Eastern Europe and the former Soviet Union, energy expropriation has increased over the 20th Century. Even Vermont, which was shown to consume the least energy of any state in America, is dependent on upwards of 700 million gallons of fuel for transportation and heating. With the production of global oil production projected to peak in the near future, Catton's (1982) proclamation that the "Age of Exuberance" has ended carries greater weight. The question of whether or not some human societies have overshot the carrying capacity of planet becomes a pressing concern. The argument advanced so far is that ecosystems produced a limited supply of oil, societies have become utterly dependent on that oil for energy, and the peaking of oil production is imminent. A signal of previous societal collapses–resource depletion–is now apparent. In conjunction with other types of environmental degradation and resource depletion, as well as climate changes generated by fossil fuel combustion discussed in the next section, several of the signals of previous societal collapses are now evident.

2.3. Ecosystem Sustainability / Disorganization

Ecosystems such as oceans and forests, Costanza et al (1997: 254) explain, provide the full range of support functions necessary for life on Earth (Table 4). Costanza et al., place the value of Earth's services at somewhere between U.S. $16–54 trillion per year, while global gross national product total is around U.S. $18 trillion per year (1997: 253). At the same, time, as the Millennium Ecosystem Assessment (2006) and other sources have made clear, human disturbances are increasingly damaging and disorganizing the services that ecosystems provide. For the purposes of this dissertation, the disorganization of Earth's atmosphere is of primary importance.

Table 4. Ecosystem Services and Human Disturbances

Ecosystem Services	Human Disturbances
Gas regulation	Deforestation, greenhouse gas emissions
Climate regulation	Deforestation, greenhouse gas emissions
Disturbance regulation	Deforestation, wetlands degradation
Water regulation and supply	Deforestation, irrigation, aquifer drawdown,
Habitats	Deforestation, desertification, agriculture
Soil formation	Soil erosion, salinization, fertility losses, agriculture
Nutrient cycling	Deforestation, damming,
Waste assimilation	Waste overload
Pollination	Species extinction,
Food production	Overhunting, overfishing, invasive species
Raw materials	Deforestation, mining,
Genetic resources	Deforestation, invasive species
Human recreational and cultural needs	Urbanization, tourism, pollution

Note: This table is meant to be illustrative rather than definitive.

Climate Change

A natural greenhouse effect—created by water vapor, clouds, and heat trapping gases such as carbon dioxide, methane, and nitrous oxide—blankets the earth and keeps the planet about 91° F warmer than it would otherwise be[12] (Salinger, 2005: 21). Earth's climate has always changed. Fagan delineates a recurring sequence of events whereby the planet's orbit shifts and the northern polar region starts receiving more direct sunlight. Glaciers and ice sheets then melt and greenhouse gas emissions from exposed permafrost and other vegetation increase, warming the planet. Decreased amounts of white, reflecting snow and ice leads to decreased "albedo" or solar reflection, so that less light is bounced back into space and more is absorbed in the oceans and atmosphere. The sequence of global warming continues until the planet's orbit shifts or volcanos erupt (2004: 25).

In the language of adaptive cycles, atmospheric concentrations of gases have been conserved for lengthy periods before natural releases led to a reorganization. For most of human evolution, Earth's climate was generally unfavorable to widespread dispersal outside of Africa- ice sheets covered large expanses of the continents. For the past 10,000 years, however, Earth has experienced an interglacial

12 The warming effect of each gas differs, with one kilogram of nitrous oxide equaling 310 kilograms of carbon dioxide and 1 kilogram of methane equaling 21 carbon dioxide equivalents (Edmonds, 2004). Nitrous oxide, methane, and the fluorocarbons have more heating power than carbon dioxide, but they are emitted in lower quantities.

period known as the Holocene, or "long summer", with a global average surface temperature of about 57°F (Fagan, 2004; Flannery 200). It is during this temperate window that every continent except Antarctica was settled and everything we count as human civilization developed: domestication of major plants and animals, agriculture, cities, written language, etc. (Kolbert, 2006; Flannery, 2005; Diamond, 1997). That is, long summer conditions have been very favorable to energy expropriation (e.g., a warmer climate and longer growing seasons), subsistence organization, and societal development.

The long summer was also punctuated with mini Ice Ages and droughts that influenced many of the well-known collapses of settled populations. Droughts in the 1280s and from 1572 to 1593 were destabilizing factors for the decline of the Anasazi in the American Southwest. Major droughts were also synchronous with the collapses of the Akkadian (4,200 years ago), Classic Maya (1,200 years ago), Mochica (1,500 years ago), and Tiwanaku empires (De Menocal, 2001). In a review of paleoclimatic data, Weiss and Bradley find that "Multidecadal- to multicentury-length droughts started abruptly, were unprecedented in the experience of the existing societies, and were highly disruptive to their agricultural foundations because social and technological innovations were not available to counter the rapidity, amplitude, and duration of changing climatic conditions (2001: 610). Given the challenges of drought-induced environmental stress, some previous civilizations collapsed (i.e., they reduced in social complexity), sometimes to return under wetter conditions but in a weakened form, and sometimes never to return.

Past climatic events were unrelated to human behavior. In terms of the specific adaptive cycle for this current period, although atmospheric concentrations of carbon dioxide and other greenhouse gases have fluctuated over Earth's history, the prevailing view is that carbon dioxide levels were about 270 parts per million (ppm) during the Holocene era or long summer prior to the Industrial Revolution. With the combustion of fossil fuels to power development since then, the atmospheric concentration of carbon dioxide has now inched up to almost 400 ppm (Dyson, 2005). In 1998, scientists in Antarctica drilled the deepest ice core ever recorded and found that carbon dioxide and methane levels are higher now than they have ever been in the past 420,000 years, going back farther than the

Holocene (Petit et al., 1999: 433). In 2005, the U.S. emitted 6,089.5 teragrams of carbon dioxide equivalents, an increase of 20.3 percent from 1990 levels (U.S. EPA, 2007). A teragram is equal to 10^{12} grams. The U.S. has historically been the largest emitter of greenhouse gases, equal to about 25 percent of total world emissions, but, according to the Netherlands Environmental Assessment Agency China surpassed America as the world's largest polluter in 2007 (Vidal and Adam, 2007).

This increase in greenhouse gases is transforming ecosystems by changing Earth's climate: melting glaciers and ice sheets are raising ocean levels, altering weather patterns (e.g., increasing the frequency and severity of hurricanes, see Emmanuel, 2005), and changing the composition of local plants and animals (i.e., pushing many species to extinction, see Flannery, 2005). The 1990s were the hottest decade on record. 2005 was the warmest year on record. Global mean surface temperature is projected to increase over the next century, exacerbating all of these transformations. In a survey of recent research on climate change, Levin and Pershin report that additional impacts will occur even if emissions are halted immediately (2006: 1).

Evidence of global climate change abounds with, for example, retreating glaciers and island nations such as Tuvalu losing ground to the Pacific Ocean. In the United States, coastal villages in Alaska are being forced to relocate (Myers, 2005). Four million acres of trees have also been killed in Alaska—the largest loss of trees ever recorded in North America—by beetles that are able to reproduce at twice their average rate due to climate change (Egan, 2002). A recent commissioned by eight countries and reporting the work of 250 scientists found that the Arctic is warming almost twice as fast as the rest of the planet (Hassol, 2004). A study in the journal *Nature* looked at over 1,700 species and found a "fingerprint" of climate change with an average range shift of 6.1 kilometers per decade towards the poles (Parmesan and Yohe, 2003). An additional increase of globally averaged surface temperature of 2.5° to 10° F is projected over the next century by the IPCC.

Climate Change in New England/Vermont

Natural ecosystems and certain sectors of the economy, including two that are very important to Vermont (agriculture and forestry), are especially sensitive to rising temperatures. A report by Clean Air–Cool Planet and the Climate Change Research Center at the University of New Hamp-

shire, titled Indicators of Climate Change in the Northeast (2005) provides detailed information about the impact of climate change on the region. Although there was variation between the different reporting stations cited in the report, taken together all of the climate change indicators for the region reveal a warming trend over the past 100 years, and especially the last 30 years:

► **Average Annual Temperatures (1899-2000):** The Northeast's average annual temperature has increased by about 1.8° F since 1899. The 1990s were the warmest decade on record. Over the last 30 years, annual average temperatures have increased 1.4° F.

► **Length of Growing Season (1874-2001):** When the station data are averaged together, the overall increase in the length of growing season is 8 days.

► **Bloom Dates for Lilacs:** There has been an average advance in the spring bloom of lilacs of about 4 to 8 days in the Northeast.

► **Timing of High Spring Flow and River Ice-Out:** High spring flow has occurred significantly earlier at most of the sites studied for the periods ranging from 50 to 95 years through the year 2000. The ice-out date has also occurred earlier and the total number of ice-affected flow days during the winter has decreased on most of the rivers studied.

► **Lake Ice-In and –Out Dates (1807-2000):** The day of ice-out has, on average, occurred earlier in recent years than it did decades ago, while the day of ice-in, recorded on Lake Champlain has been occurring later or not at all.

► **Precipitation (1900-2000):** Precipitation in the Northeast has increased by an average of 3.3 inches over the past century.

► **Intense Precipitation Events (1888-2000):** Every station investigated revealed an increase in extreme precipitation events during the 1980s and 1990s, as compared with the early 1900s.

► **Sea Level Rise (1856-2000):** Stations at New York and Boston show a rise in sea level.

► **Sea Surface Temperature (1855-2001):** Overall the sea surface temperature along the New England coast warmed significantly, with an increase of 1.1º F (8 percent) in the Gulf of Maine and 1.6º F (8 percent) on the South Shore.

► **Snowfall (1880-2001):** Most areas have experienced a decrease in total snowfall amounts.

► **Days with Snow on Ground (1970-2001):** When averaged, the Northeast stations reveal that there were, on average, 16 fewer days with snow on ground in 2001 than in 1970.

Climate models indicate a continued northward migration for maple trees as the New England climate warms and many sugar makers are fearful about their livelihoods (Hotz, 2006). Winter

activities such as skiing and snowmobiling have already been adversely impacted. Professor Daniel Scott, a Canada Research Chair in Global Change and Tourism, has spent a fair amount of time studying the impact of climate change on the ski industry. In a recent conversation, Scott revealed:

> *"What our modeling shows is that, generally, those who are on the valley floor and your mom and pop type operations will be the ones that are vulnerable. They can't sustain two, three, five bad years in a row. They just economically don't have the reserves to withstand that. Your bigger corporate players, those that are owned by Intrawest or Vail or others, the big sort of ski conglomerates, they have some of the financial reserves and they're regionally diversified so Intrawest has resorts in Vermont, Quebec, Ontario, BC, California. So a bad year in Vermont won't finish the place off because you've had a good year in BC or maybe Quebec. And they're at higher elevations. So what is going to happen is that sort of ongoing trend that you already have in the contraction of number of ski areas is going to continue, I would think, and that your bigger players and your players at higher elevation are going to be okay. They have the snowmaking [equipment], they have the higher elevation, the climate advantage. It's your smaller mom and pop shops in the valley floors who are going to go out of business."*

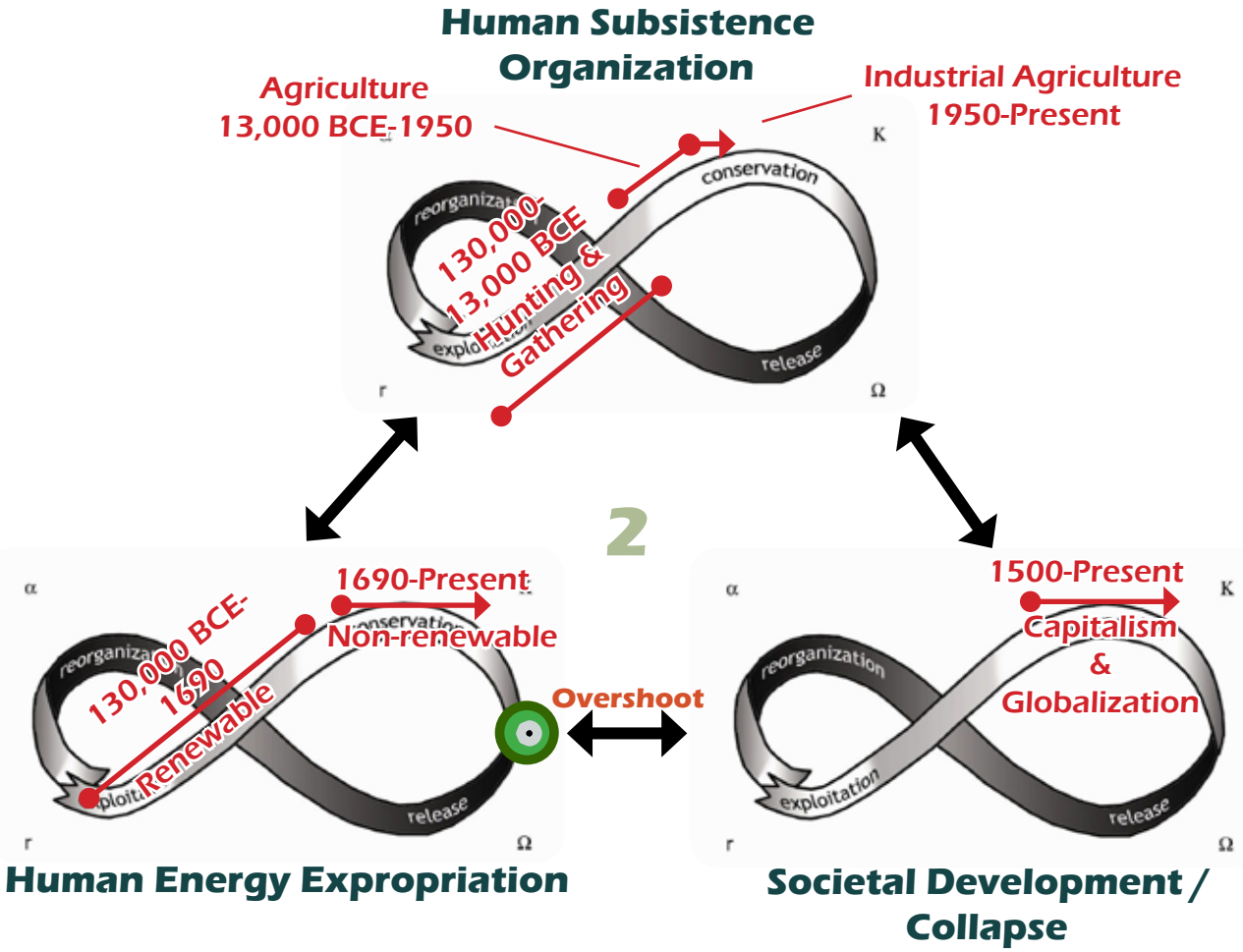
A recent study found that "No other state in New England derives as large a share of its global warming emissions from the transportation sector" (VPIRG, 2005: 7). Vermont's roughly 621,000 vehicles accounted for over 44 percent (4.02 million metric tons) of the state's carbon dioxide emissions in 2005 (Center for Climate Strategies, 2007). Vermont's residential, commercial, and industrial users accounted for another 30 percent (2.71 million metric tons). The EIA considers nuclear power and hydroelectric power to basically be carbon neutral, but emissions from system purchases, wood combustion, and a small amount of oil accounted for about 7 percent of emissions. Hence, Vermont's greenhouse gas emissions largely originate with transportation and building heating.

Act 168, signed into law by Governor Douglas in 2006, stipulates that Vermont will reduce its emissions of greenhouse gases from the 1990 baseline by 25 percent by January 1, 2012, by 50 percent by 2028, and, if practicable using reasonable efforts, by 75 percent by January 1, 2050. A 25 percent reduction is equal to 2.035 million metric tons. A 50 percent reduction is equal to 4.07 million metric tons. A 75 percent reduction is equal to 6.105 million metric tons. But it is unclear how these emissions reductions will be achieved. The majority of Vermont's electricity generation is basically carbon neutral. That leaves vehicles and home heating as the primary conversion technologies where reductions need to be achieved.

In summary, Process 1 described a perfect storm brewing: oil is the key energy resource used throughout the world, but ecosystems produced a nonrenewable amount that is rapidly being depleted by a growing human population. Human energy expropriation, particularly the combustion of fossil fuels, is warming the planet and consequently impairing ecosystem integrity. The implications for Process 2 are of no small consequence, since complex, technologically advanced societies, have depended on ever increasing energy expropriation to power societal development, and a temperate window–the long summer–in which to develop.

2.4. Human Subsistence Organization

Figure 20. Process 2: Expropriation - Organization - Development / Collapse



Process Assembly 2 depicts the relationship between human energy expropriation, subsistence organization, and development/collapse. Variations in available energy, in energy expropriated, and in climate influenced the epochal transformations from hunting and gathering to agriculture to industrial modes of subsistence (Figure 19). For all of human history until the late 1690s, humans used solar power, biomass, wind power, animal power, and muscle for warmth, lighting, cooking, food production, travel (including sailing), and other activities. Then, in the late 1690s steam power was tinkered with. From there, a steady onslaught of technologies for energy conversion developed: high pressure steam engines, batteries, electricity, combustion engines, dynamite, refrigerators, rockets, nuclear reactors, etc. (Smil, 1994: 259-269). The hard path described by Amory Lovins has materialized: the energy industry, with support from governments, has built an "enormous network of oil wells, supertankers, pipelines, coal mines, power plants, transmission lines, cars, trucks, trains, and ships" (Roberts, 2004: 2) that supplies homes, farms, stores, buildings, factories, and vehicles with power. The inclusion of dams, nuclear reactors and a small amount of renewables brings total world energy consumption to over 450 quadrillion Btus per year.

Through the luck of geography, European societies developed in what was, comparatively speaking an energy rich environment, with prize crops and animals providing the nutrients for a larger population. This food surplus provided the means for the division of labor, technological advancements (including with weapons), and hierarchical governments. Similar developments across the Atlantic–minus the animals and crops–enabled many civilizations to thrive in North and South America (Mann, 2005). As Diamond (1997) makes clear, close proximity to cows, pigs, chickens, and other domesticated animals meant that Europeans were exposed to diseases- and eventually immunities. European conquest through weapons and disease subsequently decimated indigenous populations in North America, South America, and Australia. In the 239 years from the first European colony at Jamestown in 1620 to the discovery of oil in Pennsylvania in 1859, Europeans and the descendants spread across the North American continent.

Subsistence was predicated on converting forests, prairies, and other landscapes into farms, orchards, grazing range, and other food producing areas. The use of oil to power mechanized equip-

ment (e.g., tractors), the development of refrigeration, and a transportation infrastructure meant that fewer farmers were required to grow more food that could reach dinner tables at farther and farther locations. Increasing dependence on petrochemicals for fertilizers and pesticides meant that agriculture became as reliant—directly (e.g., diesel fuel) and indirectly (e.g., commercial fertilizers and pesticides)—on fossil fuels as other sectors of the economy. American farmers are equally dependent on the vagaries of climate, with the Great Plains Dust Bowl of the 1930s providing the most vivid example of how "the convergence of socioeconomic and climatic vulnerabilities can lead to exceptional societal disruption given a relatively modest climatic anomaly" (De Menocal and Cook, 2005: S91).

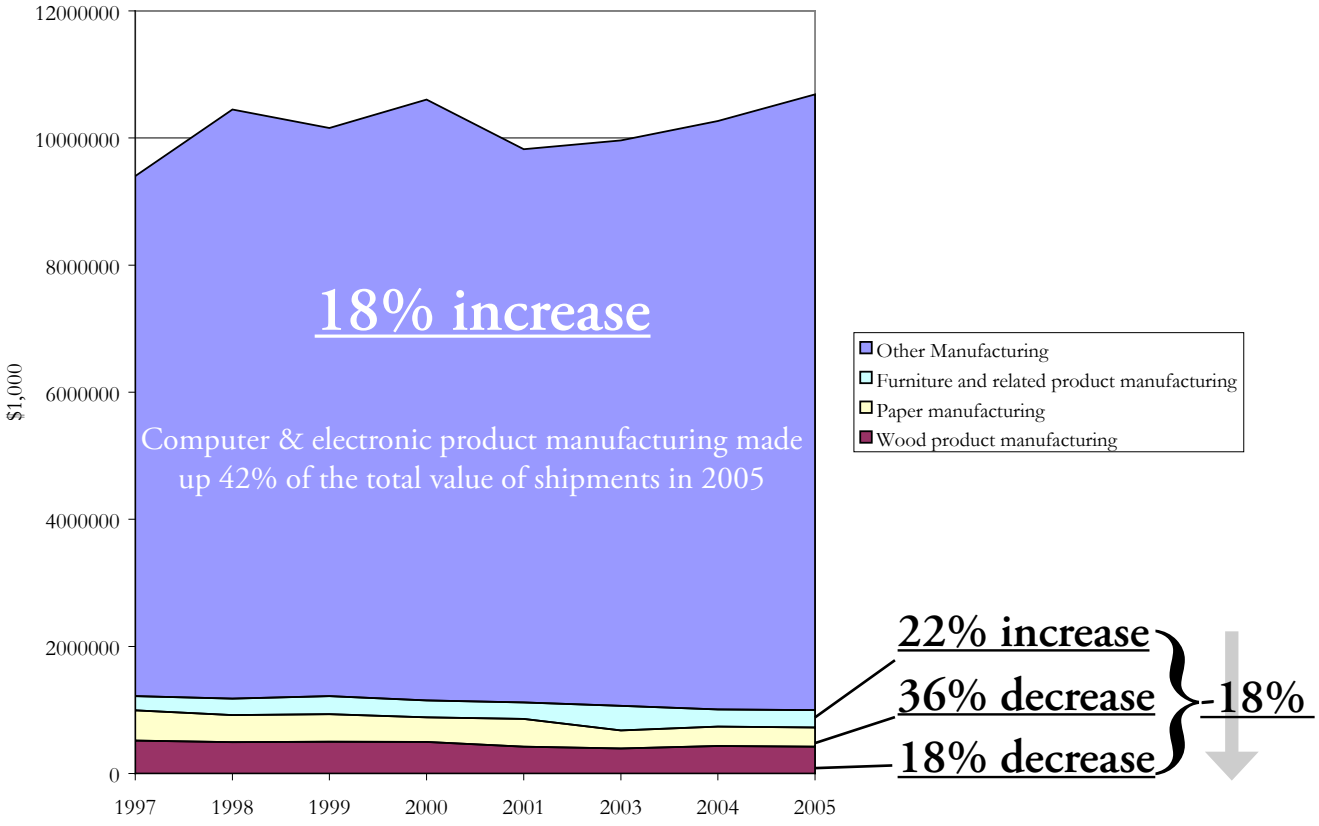
Subsistence Organization in Vermont

The national subsistence pattern is basically the same in Vermont. Indigenous peoples, usually called Abenaki, lived in Vermont for thousands of years before Samuel de Champlain sailed down the lake that was later named after him in 1609. Other French settlers followed but, after the French and Indian War, Vermont became part of New England. English settlers started moving in. After the Revolutionary War, the inhabitants of Vermont declared the area an independent Republic, and it remained that way until 1791, when it became the 14th state. Vermont remains a very rural state and its forests, farms, forest products sector and dairy products sector have historically been important for ecological, cultural and economic reasons.

Vermont's history of forest management is poor, with two-thirds of the original forest chopped down to make way for agriculture (as is happening in many parts of the world now). However, the amount of land farmed in Vermont has decreased since the middle of the 19th century and forests have consequently re-established themselves on abandoned land over the past 150 years (Wharton et al., 2003: 1). Today, 78 percent (4,628,900 acres) of Vermont is considered forested area. In a report I co-wrote identifying which rural Vermont communities are dependent on a small number of large employers for their survival, 17 of the 36 communities identified were dependent on forest products businesses (Kahler and Sawyer, 2005). Taken together, data on the health of Vermont's forest products sector presents a mixed picture. On one hand, harvests are down; mill consumption

of sawlogs and veneer logs is down; the trend line for exports is down; imports show a slight increase; and employment in wood products manufacturing and paper manufacturing are down. On the other hand, employment in furniture manufacturing and retail is up and the value of furniture shipments is increasing (22 percent), but Vermont's forest products industry contributes less and less each year to the state's economy (Figure 21). In 1997, forest products accounted for 13 percent of the value of all manufacturing shipments, In 2005, the value of all manufacturing shipments was calculated at $10,686,097,000.00, and forest products accounted for only 9 percent of that total.

Figure 21. Total Value of All Forest Products Shipments Compared to All Manufacturing (1997-2004)



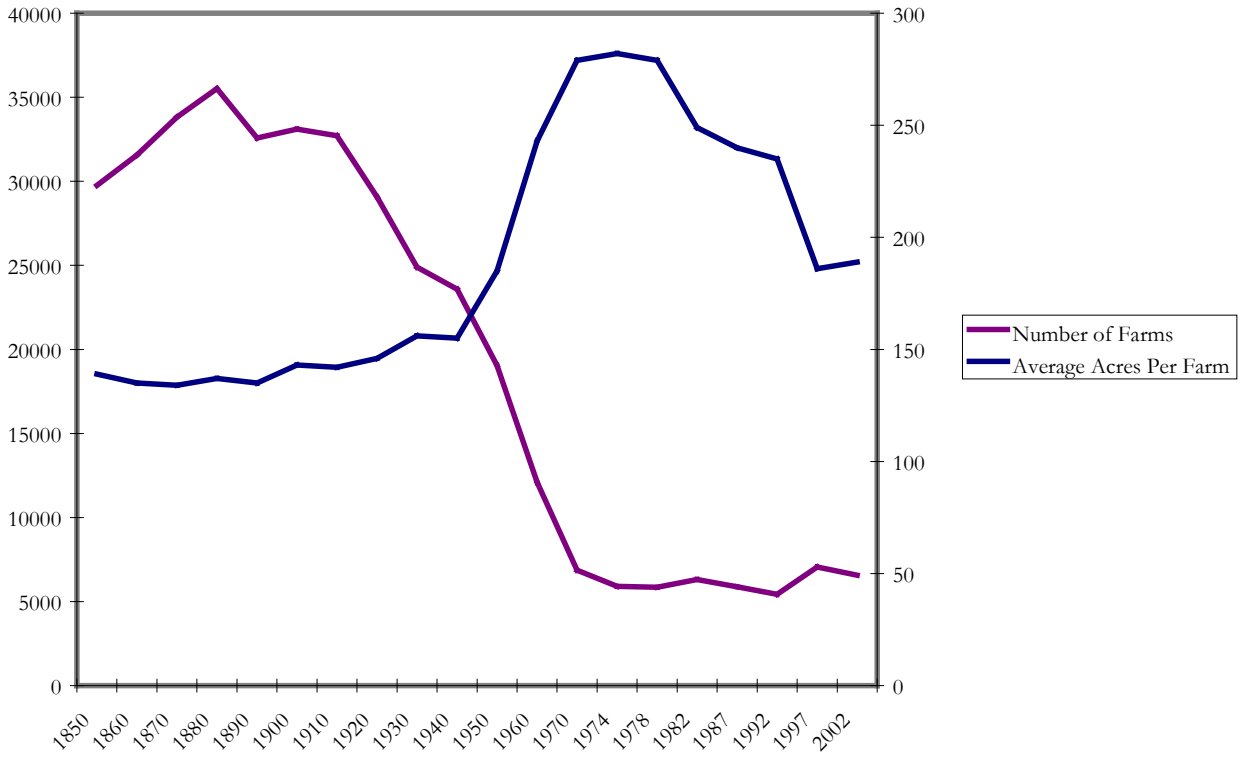
Source: U.S. Census Bureau Annual Census of Manufactures. Adjusted for inflation.

At the time of the last Agricultural Census in 2002, about 21 percent (1.2 million acres) of Vermont's land was devoted to agriculture. Vermont's agriculture is overwhelmingly devoted to producing food for cows. That is, about 97 percent of harvested cropland was devoted to forage and corn silage, while about 1.47 percent of Vermont's harvested cropland was devoted to fruits, veg-

etables, and beans for human consumption. Dairy dependence means that Vermont is largely a food importer.

A recent story in the *New York Times* quotes Professor Robert Parsons of UVM as saying that "Vermont is the most dairy-dependent state in the country." Data from the Census of Agriculture puts the total value of receipts for agricultural products in Vermont at $581,773,000 in 2004. Livestock and products sales accounted for 85 percent, or $496,846,000 of the total market value. But milk and other dairy products from cows accounted for 87 percent, or $433,823,000 of this value, or nearly 75 percent of the total value of agricultural commodities in Vermont. At the same time, government payments to the dairy industry are up a whopping 720 percent (from $2,972,000 in 1997 to $24,377,000 in 2002).

Figure 22. Number of Farms vs. Average Farm Size in Vermont, 1850-2000



US Department of Agriculture, Census of Agriculture

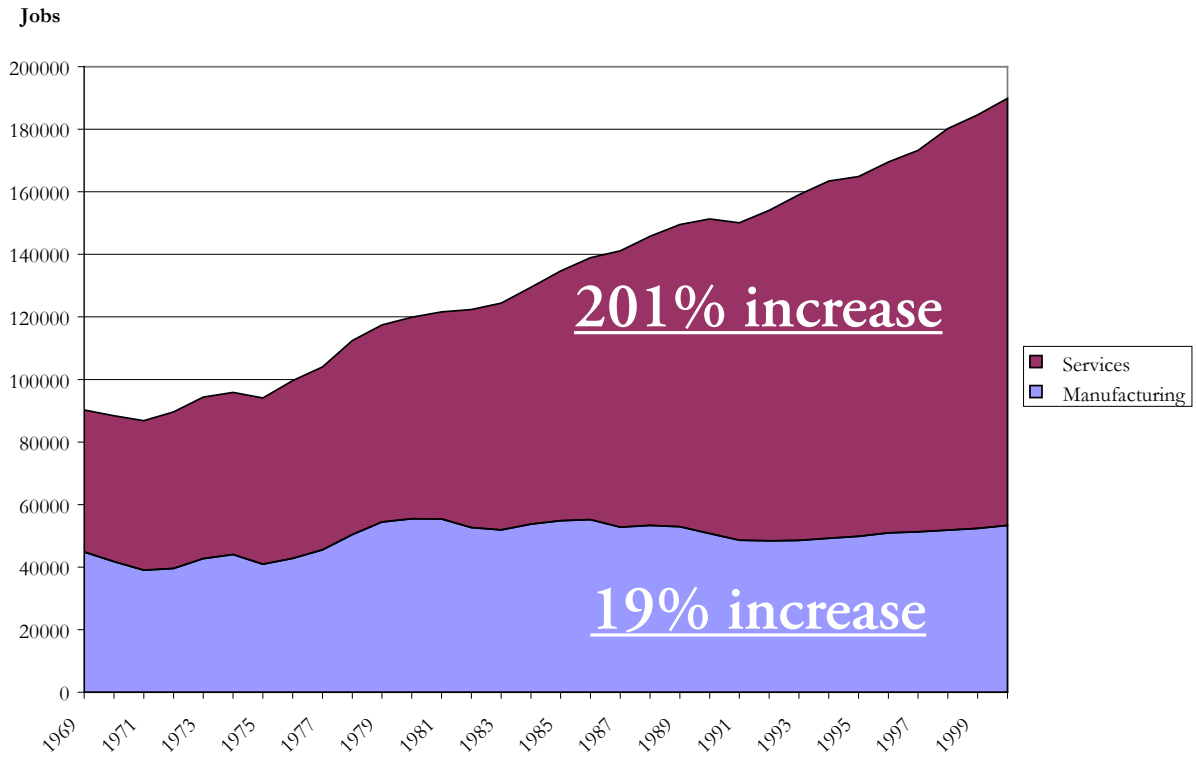
Following the national pattern, the number of farms in Vermont steadily declined (80 percent) from 1850 until the mid-1970s (Figure 22). Since then, the number has leveled off between approximately 6,000 to 7,000 farms (but still about 78 percent less than in 1850). The average farm

size in Vermont increased from the mid-1940s until the late-1970s before also declining. The acreage devoted to agriculture in Vermont has declined 70 percent from 1850 to 2002 (from 4.1 million acres to 1.2 million acres (not shown).

Vermont's dairy herd size has also been decreasing steadily for at least the past 40 years, dropping from 213,000 cows in 1966 to 141,000 cows in 2006, a 34 percent decline. Furthermore, the rate of decline was accelerated in the last 20 year period compared to the first. Between 1967 and 1987, Vermont lost 24,000 cows, just over 1,000 cows a year. Between 1987 and 2007, however, the herd has dropped at twice that rate, by 39,000 cows, or just under 2,000 cows per year. Based on this history, one could predict that the herd size will drop by 20,000 to 25,000 cows in the next 10 years, to approximately 115,000-120,000 cows by 2017. A drop of 25,000 cows equates to an approximately 18 percent decline from today's herd total.

Outside of the ups-and-downs of these hallmark sectors, how have Vermonters provisioned themselves for subsistence? According to the U.S. Bureau of Economic Analysis, there was a 6.97 percent decrease in the size of America's manufacturing sector from 1969 to 2000 (a loss of 1,431,200 jobs). During the same period, America's service sector grew by about 217 percent (a gain of 36,275,700 jobs). Vermont's service sector paralleled the national trend from 1969 to 2000, that is, it increased by 200.97 percent, or roughly 91,153 jobs. The manufacturing sector in Vermont, in contrast to the national trend, increased by 18.89 percent from 1969 to 2000, a gain of 8,474 jobs (Figure 23). However, according to the Current Employment Statistics (CES) database of the Vermont Department of Labor (http://www.vtlmi.info/ces.cfm), from September 11, 2001 to February 2006, Vermont's manufacturing sector lost an astounding 8,850 jobs (a 19 percent decrease). Vermont Department of Labor covered employment figures for 2006 show Vermont's service sector accounting for 194,741 jobs (64 percent of covered employment), manufacturing accounting for 36,243 jobs (12 percent), construction accounting for 17,332 jobs (6 percent), and all forms of government accounting for 51,613 jobs (17 percent of covered employment, with state government making up 12 percent of that total, or 2 percent of total employment [6,230]).

Figure 23. Manufacturing & Service Sector Employment, 1969-2000



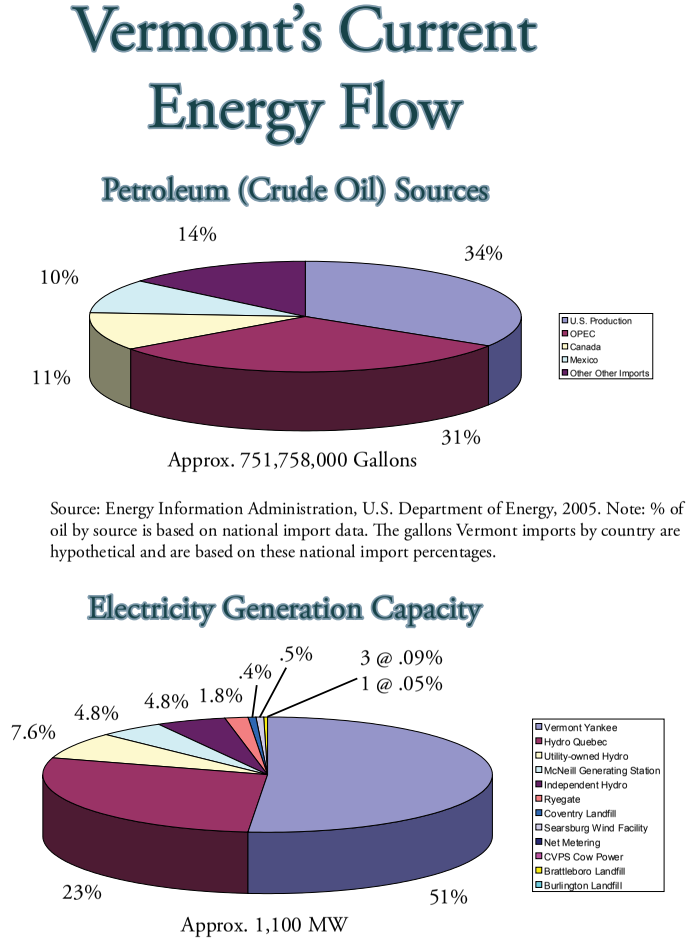
Source: Bureau of Economic Analysis

According to one historian of Vermont, the state's economy is "increasingly dependent on markets and other economies." Within the service sector, "tourism and recreation remain key contributors to the Vermont economy. Depending on estimates they account for 15 to 40 percent of all economic activity" (McReynolds, 2003: 95). Within Vermont's manufacturing sector, computer & electronic product manufacturing made up 42 percent of the total value of shipments in 2005- and most of this came from one company, IBM.

Finally, Vermont's subsistence requires the importation of large amounts of energy. Electricity was first introduced to the state in the 1880s. Vermonters currently has contracts for about 1,100 Megawatts of electrical generating capacity, derived primarily from nuclear and hydroelectric power and consume about 750 million gallons of petroleum a year, (Figure 24). Back of the envelope calculations indicate that Vermonters spends almost as much on imported petroleum and hydroelectricity each year as the entire State of Vermont budget- about $1.5 billion. Costs associated with Vermont Yankee and market purchases push the amount of money leaking out of state each year for energy

Figure 24. Vermont's Current Energy Flow

Efficiency Vermont saved 57,055 MWh in 2005. Since 2000, VT is using 5% less energy than it would have if efficiency measures were not enacted.



Source: Energy Information Administration, U.S. Department of Energy, 2005. Note: % of oil by source is based on national import data. The gallons Vermont imports by country are hypothetical and are based on these national import percentages.

Source: Vermont Department of Public Service. *2005 Vermont Electric Plan* and *Draft Update to the 2005 Vermont Electric Plan.*

well over $1.5 billion. Several sources place the peaking of world oil production between now and 2016, and Vermont's electricity contracts with Vermont Yankee and Hydro-Quebec expire in 2012 and 2015 respectively. This situation has created a climate of energy supply uncertainty and tremendous lost economic opportunities for Vermonters (e.g., biofuels, solar, and wind development).

In summary, Vermont's subsistence is based on imported food, mostly service sector jobs, and mostly imported energy. Traditional, natural resource based businesses–and the communities that depend on those businesses–have experienced a number of ups-and-downs and the bulk of jobs in the state now come from the service sector, especially tourism. In general, service sector jobs provide lower pay than manufacturing jobs, and unions are largely absent. Additionally, tourism is one of the first sectors to decline during recessions or economic hiccups (McReynolds, 2003: 95). As the price of fuel rises and as climate change forces maple tree to migrate northward, Vermont's reliance on tourism may prove to be a major Achille's heel. On the other hand, if the worst–or even the least bad–peak oil and climate change scenarios pan out, Vermont and New England still contains an "underlying fabric of towns and small cities embedded in some of the nation's best agricultural terrain, and the cultural memory for using them as an integral living arrangement still exists" (Kunstler, 2005: 289). The recent surge in sustainable development oriented businesses, organizations, and institutions holds the promise that some level of renewable energy can be produced in-state, in addition to demand-side mitigation and adaptation efforts.

2.5. Societal Development

An amplification in the amount of energy expropriated both enables and is a requirement of more complex forms of political, urban, and economic organizations. According to Freese, in sedentary societies political organization became a means to "domesticate people". With increased food surpluses and parcels of land brought into the fold, political organization became a "vessel for socially organizing and institutionalizing in human society, by means of force if not genuine authority supported by cultural values, systems of social inequality based on the control of valued resources and the means to produce, protect, and distribute them" (1997a: 171). From their origins as ceremonial meeting places, cities began to take hold wherever Neolithic agriculture, which is to say, intensifica-

tions in energy expropriation, became successful. Beyond organizing for survival, the city became a focal point for economic, political, and cultural activity, drawing in functions that had previously been scattered (Mumford, 1989 [1961). Finally, larger and more complex economic organizations developed as humans provisioned themselves for subsistence and survival with greater amounts of energy. Toman and Jemelkova assert that "Expanded availability and use of energy services is strongly associated with economic development" (2003: 94). Toman and Jemelkova have also noted a number of channels through which increased energy expropriation can stimulate economic development:

- Reallocation of household time (including "more work for mother") from energy expropriation to other pursuits, including education
- Economies of scale in industrial processes, brought about by a division of labor and technological advancements, rather than time-consuming craftsmanship
- Greater flexibility in time allocation, including the ability to work at night
- Lower transportation and communication costs
- Health benefits (e.g., clean water, refrigeration) (2003: 102).

Natural and geographical inequalities (the origins of which were outside of human control) laid the foundation for political, urban, and economic developments–including agents of conquest such as "steel swords, guns, ocean-going ships, political organization, writing, and epidemic diseases" (Diamond, 1997)–that Europeans used to secure and enhance land, resources, and other rewards. How did they do this? Tilly (1999) theorizes that rewards from resources are secured and enhanced through exploitation and opportunity hoarding. Exploitation operates when powerful, connected people command resources (natural and human-made) from which they draw significantly increased returns by coordinating the efforts of outsiders whom they exclude from the full value added by that effort (1999: 10). Europeans and Americans systematically expropriated resources from Native Americans, while simultaneously committing genocide. Africans were enslaved in order to boost ecosystem energy production in the form of crops, which Europeans and Americans converted into economic gains. Paradoxically, democratic ideals and resistance to British interference were codified in a federalist form of government in the United States, characterized by legislative, executive, and judicial branches.

In the United States, a continent full of resources, a Protestant work ethic that saw good work as the price of getting into heaven (Weber, 1996 [1904-1905), industrial and technological breakthroughs, continuous waves of immigrants, and government policies that encouraged settlement were key to the development of the country. As was briefly recounted in the previous section, subsistence was achieved through the conversion of forests, prairies, and other landscapes into farms, orchards, grazing range, and other food producing areas. Agricultural food surpluses and technological advancements, especially in the conversion of fossil fuels into energy, meant that fewer people were required to work on farms. As a result, more people moved to cities, where there was increasing economic activity due to a complex division of labor, and later, more well-to-do folks left the cities for the suburbs.

The example of the suburbanization of the United States highlights the role that episodes of structuration, where combinations of resources—both human and nonhuman—and cultural schemas—rules, norms, procedures, scenarios, tool-kits—lash up for periods of time, play in societal development. Long before there was a middle class to inhabit the suburbs, there was a "middle landscape" (Eisenberg, 1998). Conceived of as the meeting place of the city and nature, the middle landscape—or Arcadia—idyll was meant to combine the simple pleasures of rural life and wilderness with the amenities of civilization. Eisenberg hypothesizes that the myths of Arcadia reflect a refusal on our part to accept exile from Eden (i.e., confusions about our role in nature) (1998: 144). This Arcadian vision persists in the suburbs of today. Lewis Mumford long ago noted that the original purpose of the suburbs was to allow people "To withdraw like a monk and live like a prince" (1961: 486). Fishman (1996) concurs with this view and writes that suburbia is more than a collection of residential buildings (resources); it also reflects deeply held middle class values (schemas) such as leisure, the nuclear family, and union with nature (1996: 24). These middle class values, Fishman writes, are ultimately based on the principle of exclusion: the separation of work and family life, the separation of the middle class from the lower class, and Whites from others (1996: 24). He suggests that bourgeois elites collectively created the suburbs "in late eighteenth-century London" (1996: 27). But it was in post-World War II America that the attempt was made to secure the benefits of suburbia

for the whole middle class (Fishman, 1996: 32).

The historian Kenneth T. Jackson (1985) described the importance of natural resources such as "cheap" land and abundant energy, technological resources such as inexpensive construction methods, air conditioning, and improvements in transportation technology, as well as the role of land developers and government subsidies in the deconcentration of predominately middle and upper class Whites from the central cities. Resources in the form of billions of dollars of government subsidies for housing and transportation after World War II, in particular, have played a huge role in the development of the suburbs (Kay, 1997; Beatley and Manning, 1997; Sierra Club, 2000; Duany et al., 2000; Calthorpe and Fulton, 2001). Through the efforts of the Federal Housing Administration and the Veterans Administration's home loan guarantee program; the federal government has encouraged the development of conventional single-family suburban neighborhoods since the 1930s. In conjunction with subsidizing housing, "the federal government financed 90 percent of the interstate system" (Kay, 1997: 21). And, on top of government subsidies for transportation, the economic resources of the automobile, oil, transportation, and related industries contributed to the development of our infrastructure. Kunstler believes that "our economy these days is hopelessly tied to the creation and servicing of suburban sprawl" (2005: 4).

According to Molotch and Logan (1987), a city, or any locality for that matter, acts as a growth machine competing against other cities for tax base and economic activity. Understood as a "generalizable procedure" (Sewell, 1992: 8) that is applied in the enactment/reproduction of social life, growth (and its supposed benefits) is said to organize social relations, especially in terms of the development of cities. Elites, often with the financial assistance of local, state, and federal government, seek to have growth-inducing resources invested in their particular locale rather than that of another. The common interest of specific elites (everything from local business people, politicians, and media, to sports teams, museums, and universities) in pursuing exchange values "so permeates the life of localities that cities become organized as enterprises devoted to the increase of aggregate rent levels through the intensification of land use" (Logan and Molotch, 1987: 13). Indeed, "the desire for growth creates consensus among a wide range of elite groups, no matter how split they

might be on other issues" (Logan and Molotch, 1987: 50-51). In line with the Chicago School and Mumford, Molotch went so far as to say that "Conditions of community life are largely a *consequence* of the social, economic, and political forces embodied in this growth machine" (1976: 309, my emphasis).

Additionally, the construction and maintenance of the infrastructure—homes, roads, parking lots, dams, reservoirs, aqueducts, farms, stores, buildings, factories, sewers, landfills, energy generators and grids, and the linkages between all of these things—of any city or suburb requires significant amounts of energy and natural resources and generates large amounts of waste and pollution. The technological interfaces that have been developed over time (e.g., roads, pipes, power plants) facilitate the kinds of habitual activities that we take for granted—flipping on a light switch, turning on a water faucet, driving an automobile to the supermarket—which lead to more withdrawals from environmental sources and more additions to environmental sinks. It is no surprise, then, that the United States produces and consumes more energy than most continents, enabling it to flex its economic, military, political, and cultural muscle around the world.

According to Toman and Jemelkova, "Advanced industrialized societies use more energy per unit of economic output and far more energy per capita than poorer societies, especially those remaining in a pre-industrialized state." Although "energy use per unit of output does seem to decline over time in the more advanced stages of industrialization, reflecting the adoption of increasingly more efficient technologies for energy production and utilization as well as changes in the composition of economic activity" it is also the case that "total energy use and energy use per capita continue to expand in the advanced industrialized countries" (2003: 93-94).

Recently, some scholars have noted that a new era of societal development and economic restructuring–globalization–is underway. In today's era of globalization, Held et al. (1999) suggest the reach of global networks is more extensive, global interconnectedness is more intense, the velocity of global flows (e.g., money, information, goods, ideas) is much faster, and has higher impacts than any other historical period. Several prominent themes appear in the globalization literature: interconnectedness and the compression of time and space, networked businesses, resistance against globalization,

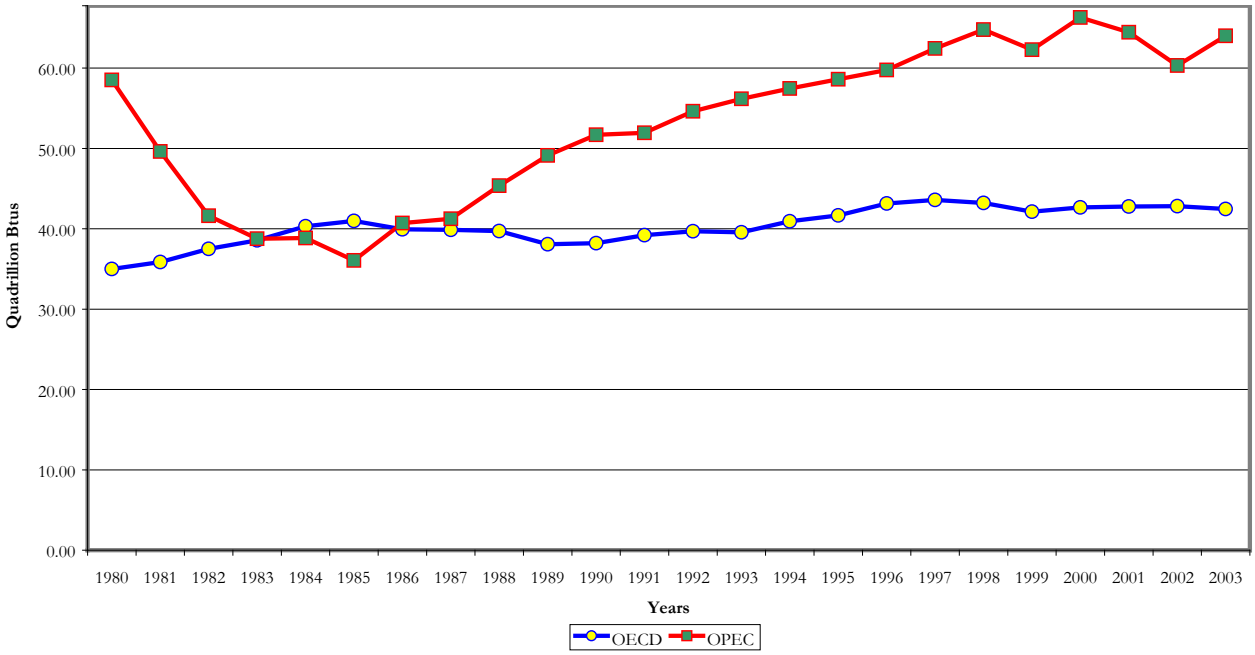
and the continuing importance of place and the nation-state.

Implicit in the theme of interconnectedness and the compression of time and space is the notion that "the constraints of geography on social and cultural arrangements recede" (Waters, 1995: 3). This is the case because "A technological revolution, centered on information technologies, is reshaping, at accelerated pace, the material basis of society" (Castells, 1996: 1). Coupled with this transformation in technology has been the rise of "hypercompetition", the second theme, (Mittelman, 2000) between multinational firms. Trapped on the treadmill of production and addicted to profits, Friedman writes "Every big multinational needs to try to sell globally, in order to make up in volume for shrinking profit margins, and it needs to try to produce globally—by slicing up its production chain and outsourcing each segment to the country that can do it the cheapest and most efficiently—in order to keep manufacturing costs down and remain competitive" (2000: 133). The third theme calls attention to the reflexive nature of globalization. That is, the benefits of globalization are called into question by "the widespread surge of powerful expressions of collective identity," such as the environmental movement, the feminist movement, and even terrorism, "that challenge globalization and cosmopolitanism on behalf of cultural singularity and people's control over their lives and environment" (Castells, 1997: 2). The fourth theme emphasizes the fact that "The Information Age" is actually organized around command and control centers (particularly North America, Western Europe, and Japan) that are able "to coordinate, innovate, and manage the intertwined activities of networks of firms" (Castells, 1996: 378). Sassen points out that while networks and flows of information and goods are important, it is also the case that the centers of "transnational economic empires," global cities—like New York, London, and Tokyo—are also "localities, with particular social and material preconditions for their global role…they connect remote points of production, consumption, and finance" (1998: xii).

Missing from these accounts, however, is any sense of just how transient and precarious this current wave of globalization is: like every other societal development of the past 150 years, globalization depends on cheap energy. That is why Kunstler calls this current era of globalization "the Indian summer of the fossil fuel era" (2005: 12), it is ripening just as the Age of Exuberance is coming to an end. This is probably the case because descriptions of the expropriation of energy that

enabled the world's command and control centers to rise to dominance are missing, and the "variable geometry" that supposedly dissolves historical and economic geography around information flows, does not take into account the fact that electrons and energy are required to keep the lights on and the computers humming.

Figure 25. OECD and OPEC Petroleum Production, 1980-2003



Source: Energy Information Administration. International Energy Annual 2003. Table 2.9.

To take the obvious example, the large increase in the price of oil brought about by the Organization of Arab Oil Exporting Countries (OPEC) embargo of countries supporting Israel during the Yom Kippur War (1973) played a central role in U.S. stagflation–inflation and economic stagnation–during the 1970s (Hunt, 2006: 61; Melosi 1985). OPEC is made up of Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, United Arab Emirates, Venezuela- none of which are considered major hubs of the new Information Age. Yet, this organization possesses the ability to shape world events: Six of the last seven recessions have also been preceded by spikes in the price of oil (Roberts, 2004: 94). The Organization for Economic Cooperation and Development (OECD), made up of central hubs in the Information Age–Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, South Ko-

rea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, and the United States–has seen its oil production basically level off (Figure 25). That is, these countries are vulnerable to the possessors of the lion's share of the world's remaining oil for energy- a fact that is largely unexamined in the globalization literature.

Societal Development in Vermont

Like every other state, Vermont developed through a series of unique structurations, based on local resources and culture, to arrive at its current state of development. The previous section pointed out that Vermont's economy has historically been organized around its natural resources, namely trees, agricultural soils, and cows. The culture of Vermont is generally recognized as being liberal and progressive. For example, although Vermont is a small state by most measures, including land area (the eighth smallest state at 5,919,600 acres), human population (2006 population: 623,908), and economy, its contributions to America's development have been substantial. Far from being "on the fringes of the national experience," Vermont has historically been at the center of a national effort to balance the "competing tensions" of modern life—freedom and unity, progress and tradition, development and preservation–in ways that enhance the quality of life of its residents (Searls, 2003). In fact, Vermont is considered exceptional for its approach to advocating equality (e.g., with the first state Constitution to outlaw slavery and with the Civil Union Law of 2000 that gives same-sex civil unions the same rights as traditional marriages); for preserving the landscape (e.g., Vermont remains billboard free); and for protecting its communities from the detrimental effects of corporate America (e.g., Montpelier remains the only state capital without a McDonald's; until 1996, Vermont was the only state without a Wal-Mart). More than 30 Vermont towns voted to impeach President George Bush at the March 2007 town meeting day, and Vermont is the only state with a Socialist as a U.S. Senator (Bernie Sanders).

Despite what can be perceived as socially progressive measures, during the past 150 years Vermont has lost more population than any other New England state, as younger people have moved away to explore more robust opportunities in other locations (McReynolds, 2003: 90). Consequently, Ver-

mont has the second highest per capita number of inhabitants over age 65 of any state (Ethan Allen Institute, 2006). Since the world is "spiky" and not flat, globalization has increased inequality between cities, regions, states, and countries that drive economic activities and those that do not (Florida, 2005: 48). Small, rural states with aging work-forces such as Vermont are bit players on the world's stage, and the traditional, natural resource based businesses–and the communities that depend on those businesses–have experienced a number of ups-and-downs as, for example, cheap furniture from China is sold at every Wal-Mart and IKEA. Despite a burgeoning environmental technology sector, one business, IBM, accounts for a substantial amount of the value of manufactured goods exported. Vermont imports the majority of its food, energy, textiles, metal, plastics, chemicals, and other items. According to Phase 6 of the Vermont Job Gap Study, subtitled "The Leaky Bucket", Vermont's "largest export is cash," with about $16 billion sent out of state every year for goods and services (Hoffer and Kahler, 2000: 15). The Job Gap Study calculates that the total value of imports were 131 percent greater than the value of in-state production, compared to a national figure of 18 percent. Such a dependence on imports hurts, as every dollar sent outside of the state is a dollar whose social and environmental consequences are out of Vermont's control. Today, the bulk of jobs in the state come from the service sector, especially medical services for the aging population, and tourism.

Against this backdrop, Vermont's state government, with over 6,000 employees and a fiscal year 2008 budget of $1,633,355,500, is responsible for "enhancing the Vermont business climate", "marketing Vermont to tourists", "strengthening Vermont communities", providing a leadership role in "developing markets for Vermont's agricultural products", "protecting and improving the health of Vermont's people and ecosystems", transporting "people and commerce in a safe, reliable, cost-effective and environmentally responsible manner", improving "the conditions and well-being of Vermonters today and tomorrow", protecting "those who cannot protect themselves", and managing the government, among other things. The state government consists of Executive, Legislative and Judicial branches (the Judicial branch is not considered in this paper). The Legislative branch consists of 30 Senators and 150 Representatives who are elected on a two year cycle. The Executive branch consists of the Office of Governor Jim Douglas, the Office of the Lieutenant Governor Brian Dubie, the Office

of the Attorney General, the Office of the Secretary of State, the Office of the Treasurer, the Office of the Auditor of Accounts, and six state Agencies. Each Vermont state Agency—and the various Departments within each Agency—is responsible for specific tasks and responsibilities (Table 5), while the Governor, Lieutenant Governor, and the Legislature are responsible for creating a vision and policies that guide each Agency.

Table 5. Vermont State Agencies and Departments

Agency	Mission	Interviews
The Agency of Administration	Combine central management of government with a specific focus on the state budget and state financial management. Composed of six Departments	Yes
1. Department of Buildings and General Services	Provides facilities maintenance, engineering, construction, and other infrastructural services to Vermont's state government.	Yes
2. The Department of Finance and Management	To promote, monitor and report upon the fiscal condition of state government.	No
3. The Department of Human Resources	Provides leadership to and works in partnership with other Departments within state government in order to promote managerial and workforce excellence while fostering an understanding and observance of regulatory requirements.	No
4. The Department of Information and Innovation	Works with Agencies to provide integrated communication and information technology services to the people of Vermont through a cost effective environment in which information is shared for the benefit of government and the public.	Yes
5. The Department of Libraries	As the state library agency, primary role is to foster and coordinate resource sharing and access to state government information.	No
6. The Department of Taxes	To collect the proper amount of tax revenue in a timely and efficient manner to pay for the goods and services people receive from state government.	No

Agency	Mission	Interviews
The Agency of Agriculture, Food and Markets	To protect the interests of the consumer and the agricultural community in the state, the region and the nation; to provide a leadership role in developing local, regional, national and international markets for Vermont products.	Yes
The Agency of Commerce and Community Development	Encompasses three major state Departments and many programs that serve the Vermont public by enhancing the Vermont business climate, marketing Vermont to tourists and others, and strengthening Vermont communities in a wide variety of ways.	Yes
1. The Department of Economic Development	To enhance Vermonters' quality of life through expanded economic opportunity.	No
2. The Department of Housing and Community Affairs	To further sustainable development of Vermont communities.	Yes
3. The Department of Tourism and Marketing	To promote Vermont as a travel destination in order to support a diverse and vital economy. The VDTM mission is accomplished through the development and implementation of a comprehensive marketing plan that integrates television, radio, newspaper and magazine print with www.VermontVacation.com.	Yes
The Agency of Human Services	To improve the conditions and well-being of Vermonters today and tomorrow and protect those who cannot protect themselves.	Yes
1. The Department for Children and Families	To promote the social, emotional, physical and economic well being and the safety of Vermont's children and families.	No
2. The Department of Corrections	To support safe communities by providing leadership in crime prevention, repairing the harm done, addressing the needs of crime victims, ensuring offender accountability for criminal acts and managing the risk posed by offenders.	No
3. The Department of Disabilities, Aging, and Independent Living	To make Vermont the best State in which to grow old or to live with a disability ~ with dignity, respect and independence.	No
4. The Department of Health	To help Vermonters live fuller, healthier lives from birth through old age.	No

Agency	Mission	Interviews
5. The Office of Vermont Health Access	To assist beneficiaries in accessing clinically appropriate health services; to administer Vermont's public health insurance system efficiently and effectively, and to collaborate with other health care system entities in bringing evidence based practices to Vermont Medicaid beneficiaries.	No
The Agency of Natural Resources	To protect and improve the health of Vermont's people and ecosystems and promote the sustainable use of Vermont's natural resources.	No
1. The Department of Environmental Conservation	To preserve, enhance, restore and conserve Vermont's natural resources and protect human health for the benefit of this and future generations.	Yes
2. The Department of Fish and Wildlife	To protect and conserve our fish, wildlife, plants, and their habitats for the people of Vermont.	No
3. The Department of Forests, Parks and Recreation	To practice and encourage high quality stewardship of Vermont's environment	Yes
The Agency of Transportation	To provide for the movement of people and commerce in a safe, reliable, cost-effective and environmentally responsible manner.	Yes
1. The Department of Motor Vehicles	Provides vehicle licensing, permitting, inspections, etc.	No
The Department of Public Service	To represent the public interest in matters regarding energy, telecommunications, water and wastewater.	Yes
The Department of Emergency Management	To respond to all hazards.	Yes

Note: All mission statements were taken directly from Agency websites.

The budget for Vermont's Agencies accounts for 56 percent of the total state budget in Fiscal Year 2008. Education funding makes up 26 percent ($342,987,989) of the remaining total, while protection services (e.g., sheriffs) are appropriated about 11 percent ($177,885,877), and debt services accounts for another 4 percent ($69,893,026). The Department of Public Service ($9,851,772) and the Department of Emergency Management ($57,321,716), are not attached to specific Agencies, but fall under the heading of protection services, accounting for 5.5 and 32.2 percent of the protection

Table 6. Agency Staff Size and Budget

Agency		Budget	Percent
Administration		$32,081,337	3.5%
Agriculture	95 FTE	$13,812,941	1.5%
Commerce & Community Development	102 FTE	$37,003,910	4.0%
Human Services		$589,164,554	64.2%
Natural Resources	630 FTE	$53,759,604	5.9%
Transportation	≈1,400 FTE	$191,489,192	20.9%
Total	**2,227 FTE**	**$917,311,538**	**100%**

Source: Vermont Department of Finance and Management. http://finance.state.vt.us/Fin%20Budget%20Documents/2008%20ebrs.pdf

services total, respectively. The Agency of Human Services (AHS) accounts for 64 percent of the budget of all state Agencies and 36 percent of the entire state budget. The AHS budget combined with the Agency of Transportation (AoT) budget together make up a little over 85 percent of the total budget of state Agencies. Thus, under "normal" conditions the bulk of state Agency resources (e.g., money and staff time) are devoted to triaging existing social problems: providing health care, protecting children, incarcerating criminals, and assisting people with disabilities. Eighty-eight percent ($168,072,367) of the AoT's budget is geared towards annual repairs to roads, bridges, culverts, etc.

As organizational theorists have pointed out, bureaucracies such as state governments are designed to coordinate the work of many people to efficiently accomplish large-scale tasks (Blau, 1956), such as providing health care, enforcing food safety standards, promoting economic development, and maintaining infrastructures. The power of bureaucracies, in one sense, comes from their ability to solve problems. For example, governmental institutions and personnel wield disproportionate power in multi-stakeholder environmental management situations, influencing the definition of the situation, resources allocated to the situation, and the group structure and decision-making processes that ultimately lead to outcomes (Koontz, 2006: 22). However, as evidenced by the federal government's reaction to Hurricane Katrina and many other events, the ability of bureaucracies to handle large-scale events is not a foregone conclusion, especially when existing problems of all scales already place governments in a reactive role. According to the adaptive cycle model, policies that come about through social structures may initially succeed in solving problems, but this may lead to agencies "that become

rigid and myopic...and a public that loses trust in governance" (Gunderson and Holling, 2002: 61). Vermont's Agency resources are overwhelmingly devoted to human services and transportation, and no Agencies are responsible for preparing for, mitigating against, and adapting to peak oil or climate change.

This is a problem, inasmuch as Process 1 of the Freese model identified a perfect storm brewing: oil is the key energy resource used throughout the world, but ecosystems produced a nonrenewable amount that is rapidly being depleted by a growing human population. Human energy expropriation, particularly the combustion of fossil fuels, is warming the planet and consequently impairing ecosystem integrity. The implications for Process 2 are of no small consequence, since complex, technologically advanced societies, have depended on ever increasing energy expropriation to power societal development, and a temperate window–the long summer–in which to develop. Vermont consumes the least oil of any state, but is still dependent on over 700 million gallons of the stuff. Vermont also emits the lowest amount of greenhouse gas emissions of the states, but its ecosystems and certain sectors of its economy are already being disrupted. Vermont's subsistence is based on imported food, mostly service sector jobs, and mostly imported energy. The natural resource based businesses–and the communities that depend on those businesses–that have historically been the foundation of Vermont's economy have experienced a number of ups-and-downs and the bulk of jobs in the state now come from the service sector, especially tourism. As the price of fuel rises and as climate change forces maple tree to migrate northward, Vermont's reliance on tourism may prove to be a major Achille's heel. Large chunks of the state government budget are devoted to providing services for *existing* social problems (health care and passable roads) and state Agencies are effectively siloed with specific missions and responsibilities. *And*, in the cases of the Agencies of Administration (AoA), Agriculture (AoAg), Commerce and Community Development (ACCD), and Natural Resources (ANR), state Agencies are equipped with relatively small budgets. The cherry on top is that the state's contracts with Vermont Yankee and Hydro-Quebec–which provide most of the state's electricity–are set to expire in 2012 and 2015, respectively.

In summary, the missions, budgets, and responsibilities of Vermont's state Agencies effectively place them in silos. The bulk of the budgets for all six Agencies are devoted to human services and road construction and not coordination to address peak oil and climate change. The Administration and the Legislature have exhibited considerable variation in problem setting and strategies for action, that is, a lack of coordination, with the end result that there is no "high reliability network" (Ginter et al., 2006) exhibiting 'big picture' communication, decentralized decision-making, extensive training, aggressive information seeking, and strong leadership on peak oil and climate change in Vermont. Since modern societal development took place during a window of relatively stable climate and an era of abundant resources, the possibility exists that climate change and peak oil production will trigger a decline in societal complexity–collapse–especially if government concern and capacities are not aligned.

2.6. Collapse

Humans organize socially for survival (Freese, 1997a). In this sense, societies are both solutions to problems and problem solving organizations themselves (Tainter, 1988, 1996). The division of labor for attaining food, water, shelter, energy, and for establishing security, endless developments in technology, the Industrial Revolution, the formation of social structures such as states, economies, and many other complex developments can be viewed as solutions to problems. The broad sweep of history attests to the fact that societies are also problem creating organizations (Schnaiberg and Gould, 1994). For example, economic actors (primarily corporations) solve one type of problem–the pursuit of profits–by using and degrading ecological resources and externalizing social and environmental costs. Other examples of human produced problems, accidents, emergencies, disasters, and catastrophes abound: the Chernobyl nuclear accident, Hurricane Katrina, the chemical poisoning of thousands at Bhopal in India, the Exxon Valdez oil spill, flooding and landslides due to deforestation in South America, famine in Somalia and Ethiopia, genocide in Bosnia and the Sudan.

Beyond accidents, emergencies, disasters, and catastrophes is the spectre of societal collapse. The geographer and historian Joseph Tainter defines collapse as "a rapid, significant loss of an established level of sociopolitical complexity" (1988: 4). Biogeographer Jared Diamond characterizes collapse as

"a drastic decrease in human population size and/or political/economic/social complexity, over a considerable area, for an extended time" (2005: 3). In the run-up to and aftermath of collapse, societies experience a breakdown of authority and governance (including law and order), reduced trade and construction, population dispersal (from greater to lower density), and a general return to local self-sufficiency to meet the needs of a smaller population. In other words, the "overarching structure that provides support services to the population loses capability or disappears entirely" (Tainter, 1988: 20).

In retrospect, we know that the power elite and inhabitants of Chaco Canyon, Mesopotamia, Rapa Nui, and many other places made decisions and interacted with nature in ways that ultimately undermined the long-term sustainability of their societies. In several instances the local climate changed from wetter to drier conditions, precipitating collapse and/or amplifying a trajectory toward collapse. Comparatively speaking, previous collapses were spatially bounded (e.g., several occurred on islands), ecological degradation was limited rather than widespread, and smaller populations of sometimes pre-literate societies with minimal communications technologies were involved.

Modern societies are more technologically sophisticated, historically aware, scientifically knowledgeable, and interconnected than ever before. This "conjuncture of foresight and unprecedented willful power" (Pierrehumbert, 2006: 2) focuses attention on decisions made–and not made–by authorities. Today, organizations such as government bureaucracies–rather than chiefs, kings, or emperors–are designed to coordinate the work of many people to efficiently accomplish large-scale tasks (Blau, 1956; Mann, 1986), including energy and resource planning; ecosystem protection; and disaster preparedness, response, and mitigation.

Charles Perrow describes organizations as both "the most powerful force in industrialized societies" (2000: 469) and "the most intensive and effective environmental destroyers" (1997: 66). This is the case for corporations because corporate managers are constrained by the demand for expanding profits and there is enduring pressure to externalize true ecological and social costs. Governments, on the other hand, are stuck between the rock of "national development" and the hard place of "social security". That is, government bureaucracies are also dependent on the "treadmill of production" and must work to facilitate its expansion, but they are also accountable for the common welfare (Schnai-

berg and Gould 1994: 69). The authority of government bureaucracies, in contrast to corporations, comes from their responsibility and ability to solve these kinds of problems, but the effect of modern traumas such as Three Mile Island, Chernobyl, and Hurricane Katrina is to erode civic trust in the ability and authority of governments to provide safety nets (Erikson, 1994).

Cycling through to the end of Process 2, Freese states that as the quantity and quality of energy available for work declines, so to does the "quality of the organizations, institutions, traditions, and material subsistence that have developed in terms of and because of an energy surplus" (1997: 84). Many scholars have converged on three major energetic factors undermining past civilizations: human societies can overshoot the carrying capacity of their ecosystems by (1) **depleting natural resources,** particularly energy, while simultaneously (2) **degrading ecosystems** (e.g., deforestation). Past societies facing sudden and prolonged (3) **climatic events**, such as droughts, face the possibility of collapse, and climate changes that intersect with resource depletion and ecosystem degradation increase the possibility of collapse (Good and Reuveny, 2006 Diamond, 2005; Fagan, 2004; Janssen and Scheffer, 2004; Thompson, 2004; Wilkinson, 2004; Weiss and Bradley, 2002; Chew, 2001; De Menocal, 2001; Fernandez-Armesto, 2001; Tainter, 2000, 1996, 1988; Eisenberg, 1998; Rosa and Dietz, 1998; Ponting, 1991; Catton, 1982; Hughes, 1975). The first two factors are variations on Freese's theme in the sense that resource depletion and ecosystem degradation reduce the amount of energy produced by ecosystems and consequently available to societies. The third factor was out of human control for most of history, although climate changes brought altered weather patterns such as droughts that, when intersected with bad agricultural practices and deforestation, hastened collapse. The expropriation and combustion of fossil fuels to power societal development and the clearing of forests for housing and development has increased the global mean surface temperature of the planet by about 1° Fahrenheit over the 20th century. Anthropogenic climate change is altering ecosystems and hence the energy available for human use and the material basis for survival.

Tainter's classic account (2000; 1996; 1988), for example, asserts that societies require increasing energy expropriation or they eventually collapse. Tainter defines collapse as a process of decline in complexity. Complexity "is generally understood to refer to such things as the size of a

society, the number and distinctiveness of its parts, the variety of specialized roles that it incorporates, the number of distinct social personalities present, and the variety of mechanisms for organizing these into a coherent, functioning whole" (1988: 23). Societal collapses extend beyond accidents, emergencies, disasters, catastrophes in the sense that:

- All community infrastructure is heavily impacted and victims exceed available resources;
- all community or economic functions are interrupted;
- collapses are nonroutine are largely irreversible;
- relevant response organizations will not have planned for the event;
- the length of victim and response involvement is long-term;
- local resources are diminished and assistance from nearby sources may not be available.

Tainter views collapse as a four part process that erodes complexity and unfolds over decades or centuries:

1. Human societies are problem-solving organizations
2. Sociopolitical systems require energy for maintenance
3. Increased complexity carries with it increased costs per capita and
4. Investment in sociopolitical complexity as a problem-solving response often reaches a point of declining marginal returns (1988: 93).

The list of collapsed societies is large: The Roman Empire; the Western Chou Empire; the Harappan civilization; Mesopotamia; Norse Greenland; the Egyptian Old Kingdom; the Hittite Empire; Minoan civilization; Mycenaean civilization; the Olmec; the Lowland Classic Maya; the Mesoamerican Highlands; the Chacoans; the Anasazi; the Hohokam; the Eastern Woodlands of North America; the Huari and Tiahuanaco Empires; the Kachin of Burma; the Ik of Uganda; Easter Island or Rapa Nui; and recently the Soviet Union. In each instance, Tainter believes societies came up against "declining marginal returns" in investments in government that made complexity less attractive. The best way to circumvent declining marginal returns in complexity is to expropriate more energy but, as ecosystems become degraded, populations crowd each other, or sudden climatic events appear, grabbing more energy may not be possible. Since societies are problem-solving organizations, people either choose to return to local self-sufficiency to meet the needs of a smaller population or they continue to invest in a level of complexity that becomes vulnerable to collapse (e.g., increased taxes and other costs bred disaffection, which frequently led to violence). Other researchers refer to

the concept of sunk costs—an unwillingness to abandon something (e.g., a settlement) if a great deal has been invested in it, even if future prospects are dim—to explain declining marginal returns (Janssen and Scheffer, 2004: 1).

Other scholars have emphasized "a constellation of crises" to explain past collapses. For example, Thompson finds that "An empirical examination of Mesopotamia and Egypt for the 4000–1000 BCE period shows a statistically significant relationship between climate deterioration and river level fluctuations, hinterland incursions, trade collapses, and political regime changes" (2004: 617). Thompson asserts that political regimes subsisting on fragile and arid ecosystems could not be expected to survive the erosion of basic resources and environmental shocks, and so trajectories of diminished marginal returns were accelerated (2004: 617-618).

Diamond's best-selling *Collapse* builds off the constellation of crises perspective. He defines collapse as a "drastic decrease in human population size and/or political/economic/social complexity, over a considerable era, for an extended time" (2005: 3). He presents a five-point framework of possible contributing factors for collapse:

1. Environmental damage (deforestation and habitat destruction, soil problems (erosion, salinization, and soil fertility losses), water management problems, overhunting, overfishing, effects of introduced species on native species, human population growth, and increased per capita impact of people
2. Climate change
3. Hostile neighbors
4. Decreasing support from friendly trade partners:
5. The society's response to its environmental problems. In particular:
    - A. A group may fail to anticipate a problem before the problem actually arrives.
    - B. Second, when the problem does arrive, the group may fail to perceive it.
    - C. Then, after they perceive it, they may fail even to try to solve it.
    - D. Finally, they may try to solve it but may not succeed (2005:421).

Diamond asserts that the first four factors may or may not have proven significant for a particular society, but a society's response to environmental problems is always a factor (2005: 11). For example, Hostile neighbors, lack of support from friends, and climate change played no role in the collapse of Rapa, but environmental degradation and the society's response to its environmental problems did. With the Mayans, a constellation of crises–population growth outstripped available

resources; deforestation and hillside erosion decreased the amount of usable farmland; fighting increased over fewer resources; a severe drought occurred; and Mayan leadership focused on the short-term and their own aggrandizement–led to collapse (2005: 176-177). Diamond's approach is similar to Tainter's in the sense that human decision-making is front and center, and both scholars fear that global collapse is possible. Diamond's hypothesis that societies can fail to anticipate, perceive, solve, or try to solve problems but fail, is similar to concepts previously introduced: intuitions, concerns, cultural schemas, lack of capacities, lack of a high reliability network, etc.

With the emergence of global climate change and global peak oil production, the old set of factors–resource depletion, ecosystem degradation, and climate change–have the potential to wreak havoc in new ways, as they impact every society on the planet at the same time, in ways that amplify other problems, and that realistically pose the threat of global societal collapse. Biosociocultural reorganization is now underway, but there is no Federal strategy for preparing for, mitigating against, and adapting to peak oil (GAO, 2007: 6) or climate change (Lutzenhiser, 2001a). Likewise, Vermont has no coordinated, strategic response for dealing with peak oil and climate change.

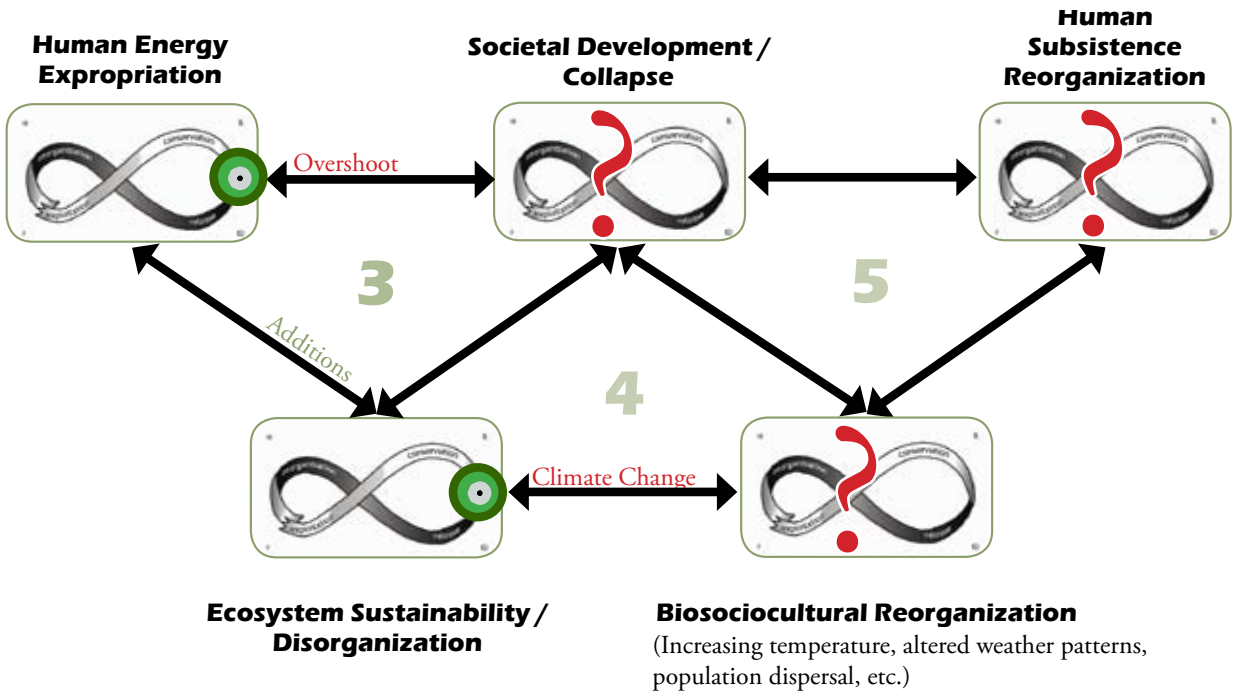
In summary, Process Assembly 2, depicting the relationship between human energy expropriation, subsistence organization, and development/collapse is what my dissertation is all about. Given the circumstances of Process Assembly 1, my thesis is that Vermont's state government has not acted reliably, to date, to help Vermonters prepare for, mitigate against, and adapt to peak oil and climate change. It is unclear what decisions the state will ultimately make with regard to climate change and peak oil, but it is clear that biosociocultural reorganizations are already taking place around the world.

2.7. Reorganization

Processes 1 and 2 indicated that the amount of energy (oil), available for human energy expropriation is declining, while ecosystems are being disorganized due to climate change and other human disturbances. We know that these three factors–resource depletion, ecosystem disorganization, and climate change–and societal responses to these factors played major roles in previous

societal collapses. We do not know that peak oil and climate change will lead to global societal collapses, but the scale of both of these problems is sufficiently unprecedented that the question merits attention. Biosociocultural reorganizations are already taking place in Processes 3, 4, and 5: ice sheets are melting, Alaskan villages are being relocated, coral reefs are dying, island nations are eyeing rising ocean levels, etc. But we do not know how human subsistence will ultimately be reorganized. And so, my review of Freese's model with Vermont specific information ends with a set of speculations and questions about the future.

Figure 26. Reorganization: The Great Unknown



On one hand, sustainable development advocates believe that a less apocalyptic future is possible. Social life may indeed have to become more localized, but techno-optimists, industrial ecologists, ecological modernization proponents, and others believe that energy efficiency can wring power out of wasteful processes and technologies. The renewable energy sector for electricity and transportation (e.g., biofuels and wind power) is rapidly emerging. Conservation behaviors can be aided by smart growth, public transportation and new technologies. Community supported agriculture can be expanded to provide more of our local food needs. Additionally, we know that high reliability organizations (e.g., air traffic control towers, aircraft carriers) and high reliability networks (e.g., emergency

responders such as police and paramedics) are possible. In the context of Freese's framework, HROs would work to ensure system resiliency by building renewable energy systems, reducing energy consumption, and minimizing ecosystem disorganization. We have some notions about the "sociotechnical preconditions" necessary "for a range of possible futures" (Shove et al., 1998: 320), but given the current lack of political urgency and will to develop these preconditions, it is not clear how they will develop.

On the other hand, commentators such as Kunstler believe that "The world oil production peak represents an unprecedented economic crisis that will wreak havoc on national economies, topple governments, alter national boundaries, provoke military strife, and challenge the continuation of civilized life" (2005: 24). He continues "…all the major systems that depend on oil—including manufacturing, trade, transportation, agriculture, and the financial markets that serve them—will begin to destabilize" (2005: 67), and Russia, "with its decrepit infrastructure, imploded industrial economy, tattered social safety net, and demoralized citizenry," will become the "prototype for the fate of industrial societies of the Long Emergency" (2005: 170). Climate change prognosticators are no less cheery, with images of drowned polar bears, extinct species, environmental refugees and other ruinous events predicted to take place. We also know that, despite the fact that societies are problem solving organizations, our ancestors acted and reacted in ways that failed to preserve the sustainability of their societies.

Given our historical-awareness, our technological sophistication, our skills and capacities for adaptation, our hopes and dreams for the future, why aren't decision-makers displaying greater urgency, working proactively, and coordinating to help their constituencies prepare for, mitigate against, and adapt to the combination of peak oil and climate change? Why aren't governments acting reliably? The next chapter focuses on sociological literatures that shed light on this question.

3. Literature Review and Theory Development

If climate change and peak oil are unprecedented problems that have the ability to cause global societal collapse, why aren't governmental institutions acting reliably to help their citizens prepare for, mitigate against, and adapt to them? Why aren't governments acting like HROs? The first four sections of the literature review examine works from "classical" sociology, disaster studies, organizational theory, and political sociology that attempt to answer these questions. These literatures were selected because they share a common interest in understanding how social structures and organizational cultures influence *decision-making*, for good and ill. Each section outlines contributions to my understanding of organizational decision-making and impediments to reliability within Vermont's state government. Section five synthesizes the main contributions of these mainstream literatures-mainstream in the sense that they largely ignore the ecological basis for life support. Section six reviews the contributions of the environmental sociology literature to this topic, while section seven synthesizes the contributions of the conventional sociology and environmental sociology literatures.

3.1. The Classics

The intellectual heritage of sociology was largely concerned with the *emergence* of social order, or social structures. Emile Durkheim's major works on the development of religion (1912) and the division of labor (1893) helped to explain the roots of social cohesion, solidarity, and complexity. *The Gift* (1990 [1923-24]), by Marcel Mauss, theorizes that gift-giving builds relationships of exchange and reciprocity. Talcott Parsons Adaptation-Goal attainment-Integration-Latency (AGIL) system is meant to capture the universe of human activities (1977). Karl Marx and Friedrich Engels (1848, 1867) critique of capitalism maintains that antagonistic relations between classes establishes the social order of any era. Max Weber's chief contributions include the theory that Protestant (Calvinist) religious ideas gave rise to a type of rational capitalism and way of life characteristic of the United States (1904-1905), and an essay–*Politics as a Vocation*–that asserts that governments have a monopoly on the authority to use force (1919). Charles Horton Cooley's "looking-glass self" (1964), George Herbert Mead's social psychology (1934), and Erving Goffman's 'all the world's a stage' approach

(1959) stressed the role of the actor, or individual, in shaping society. Taken together, the core contributions of classical sociologists, whether in the guise of functionalism, conflict theory, symbolic interactionism, or any of the "neo" disciples and micro-macro variations, have been to illuminate the emergence and continuation of social order or social structures.

The social costs of the division of labor, industrialization, capitalism and bureaucracy were evident to Marx (alienation), Durkheim (suicide and anomie), and Weber (the iron cage), and, of course, Marx's lasting infamy is predicated on his call for a working class revolution to overthrow the bourgeoisie. On the other hand, the equilibrium of race, class, gender, economic, and political structures has been very durable, with occasional social movements and other activities punctuating the status quo. How can characteristics of unreliable organizations get 'locked' into place in social structures such as governments? How can government structures be transformed?

Anthony Giddens' (1984) "theory" of "structuration" to be an excellent starting point for understanding social structures. His proposition is that structures are both the medium and outcome of interactions. Structures are composed of *rules* and *resources* that people draw upon during interactions and that are also reproduced during such interactions. The "most deeply-layered practices" that make up social systems are institutions such as Vermont's state government (Giddens, 1984: 117). The rules and resources that are created, used and reproduced by Vermont's state government create 'structures of domination', 'structure of legitimation', and 'structure of significance' that guide decision-making and provide the building blocks for a wide variety of activities and social services in Vermont.

Elaborating on Marx and Mills, as well as modifying Giddens' theory of structuration and Bourdieu's notion of habitus, Sewell (1992) expands the notion of rules to "schemas". From his perspective, structures are sets of mutually sustaining schemas—rules, situations, norms, our "cultural toolkits" (Swidler, 1986)—and resources—both human and non-human—that empower and constrain social action and that tend to be reproduced by social action. Schemas are described as generalized procedures for doing things that can be "applied in or extended to a variety of contexts of interaction" (Sewell, 1992: 8). Nonhuman (i.e., "animate or inanimate, naturally occurring or

manufactured") and human (i.e., "strength, dexterity, knowledge, and emotional commitments", etc.) resources are described as "media of power" that are unevenly distributed (Sewell, 1992: 9-10). Keeping Giddens' notion of the duality of social structures, Sewell writes, "Schemas are the effects of resources, just as resources are the effects of schemas" (1992: 13). Structures come into existence only when sets of schemas and resources "mutually imply and sustain each other over time" (Sewell, 1992: 13). From this perspective, although structures powerfully shape our lives, structural transformation is possible because people (agents) have knowledge of the schemas that inform social life and have access to some degree of human and non-human resources.

Whether one is referring to race, class, or gender structures, treadmills of production, iron laws, or iron cages, world systems, corporations, or infrastructures, conceiving of social structures in this manner allows for examinations of the combinations of resources and schemas underlying each context. And knowledge of the resources and schemas composing each context provides the rationale Sewell needs to propose five axioms that help to explain why structural transformation is possible: the multiplicity of structures, the transposability of schemas, the unpredictability of resource accumulation, the polysemy of resources, and the intersection of structures (1992: 16). By **multiplicity** of structures, Sewell means that variation in the constitution of structures is possible because knowledgeable social actors are "capable of applying a wide range of different and even incompatible schemas and have access to heterogeneous arrays of resources" (1992: 17). Schemas are **transposable** in the sense that they can be creatively applied to "a wide and not fully predictable range of cases outside the context in which they are initially learned" (1992: 17). As an example of the **unpredictability** of resource accumulation, Sewell suggests that using a new technique to plant a crop in a familiar field may result in subsistence, starvation, or plenty. That is, "the very fact that schemas are by definition capable of being transposed or extended means that the resource consequences of the enactment of cultural schemas is never entirely predictable" (1992: 18). The **polysemy**—or multiplicity of meaning—of resources depends on the assertion that resources embody cultural schemas. So, Sewell notes, the form of a factory embodies the capitalist notions of property relations but, at the same time, it can also teach the social and collective character of production and undermine

capitalist notions of private property: "Any array of resources is capable of being interpreted in varying ways and, therefore, of empowering different actors and teaching different schemas" (1992: 19). Finally, structures **intersect** so that resources can be claimed by different actors embedded in different structural complexes and schemas can be borrowed or appropriated from one structural complex and applied to another (1992: 19).

Sewell's expansion from rules to cultural schemas is helpful in the sense that it builds in the notion of culture to social structures. For example, we can say that a particular social structure, composed of resources and schemas or cultural toolkits, "influences how an organization's members define, or "set," problems and the strategies they draw on to solve such problems" (Howard-Grenville, 2006: 46).

As an example of structuration in action, Medvetz's ethnography of "Wednesday meetings" of conservatives at the nonprofit organization *Americans for Tax Reform* explains that the meeting "functions as both an *instrument of material power* and a *ritual of symbolic maintenance* in sustaining a moral community of conservative activists" (2006: 345, italics in original). That is, "the gathering provides a setting in which activists pool, exchange, and deploy the resources needed for collective action, such as money, facilities, labor, and information." At the same time, the meeting provides a venue for a range of participants to specify, debate, and reaffirm the core principles– opposition to the New Deal, anti-tax, religious and social conservativism–"that animate their movements and construct the symbolic vehicles through which they mobilize resources" (2006: 357). As a result of this lashing up of resources and schemas, the Republican Party has dominated American politics for decades.

Classical Sociology Summary

► In summary, the classical sociology literature theorizes that social structures are composed of combinations of resources and schemas that enable and constrain action. The question becomes, which combination of resources and schemas (or toolkits) lead to characteristics of unreliable organizations? For example, if organizational resources at Vermont's Agencies and Departments are already spread thin reacting to existing problems and serving existing missions, then inter-Agency/in-

ter-Department coordination may be difficult. The diffusion of responsibility amongst government organizations may inhibit domain consensus or a unified plan for preparing for, mitigating against, and adapting to peak oil and climate change. As Page 81 indicated, budgets and other organizational resources devoted to human services and transportation take up a huge chunk of Agency budgets. Vermont's government organizations may not have the necessary resources and capacities to prepare for, mitigate against, and adapt the state to peak oil and climate change. Cultural schemas, such as the core principles of Republicans and conservatives, may discourage "collectivist impulses" (Medvetz, 2006: 359) to address peak oil and climate change, while encouraging the view that government should not act as a leader. Research questions, therefore, were aimed at understanding the resources and schemas that make up the various organizations in Vermont's state government.

3.2. Disaster Studies

In contrast to classical sociology, with the advent of disaster studies following World War II sociologists began to generate theories and research programs to understand how societies can unravel. The field of disaster studies was spawned and shaped by the U.S. military from 1950-1965, with the intention of extrapolating responses from natural and industrial disasters to wartime situations (Quarantelli, 1987: 288). For example, what could public response to chemical spills indicate about how Americans would react to nuclear war? In his retelling of the history of disaster studies, Quarantelli indicates that the first decade or so of government support for the research was aimed at wartime and/or military applications, such as reduction and control of panic and fear (1987: 298). Early research was also characterized by an emphasis on reaction, not prevention, and a model of personal breakdowns during disasters which, again, required the imposition of social control (Quarantelli, 1987: 299).

With the establishment of the Disaster Research Center[13] at Ohio State University in 1963 (later moved to the University of Delaware) the field of disaster studies became decidedly sociological. Over the past forty years, the Disaster Research Center (DRC) has developed theory and research methodologies, and conducted well over 200 studies of disasters (including over 40 studies of earth-

13 Url: http://www.udel.edu/DRC/publications.html

quakes, at least eight studies of floods, and over ten studies of chemical spills) and organizational response to disasters (e.g., police, fire departments, the Red Cross, hospitals, public works departments, as well as responses to 9/11 and Hurricane Katrina). Of particular relevance, the DRC and other schools such as the Natural Hazards Center at the University of Colorado at Boulder[14] have 1) emphasized viewing disasters as social phenomena, 2) proposed a generic approach that emphasizes integrated planning and operations for all hazards, rather than an "agent specific" approach, 3) identified a disaster typology, and 4) uncovered factors that account for ineffective and effective responses to disasters.

Disasters are Social Phenomena

For most of human history, disasters such as volcanic eruptions and earthquakes were viewed as "Acts of God". More recently, science has replaced superstition and, for example, earthquakes are now understood to result from plate tectonics. In either event, Quarantelli notes, an act of god or an act of nature refers to something that is external and beyond the control of the human victims. Alternatively, disaster researchers have advanced the idea that "all disasters are always primarily the results of human actions" (Quarantelli, 1993: 14). That is, a disaster is not the actual physical event of tectonic plates moving or rivers flooding, it is the intersection of some event with human activities that makes it a disaster (Quarantelli, 1993: 14). Viewing disasters as social occasions places emphasis on internal rather than external factors, proactive rather than reactive stances, and highlights vulnerabilities that could theoretically be reduced through policies and programs (Quarantelli, 1993: 15-17).

Agent Specific vs. Generic Approaches to Disasters

Disaster researchers have distinguished agent specific and generic approaches to disasters. The agent specific approach "assumes that each type of hazardous agent (e.g. a volcanic eruption, a nuclear radiation fallout) or classes of agents (e.g., natural or technological) have certain distinctive characteristics that have consequences for what occurs." The generic approach, on the other hand, assumes that the characteristics of responses to disasters are more similar than dissimilar (Quarantelli, 1993: 7). Integrated planning and operations for all types of hazards is viewed as more cost-efficient

14 Url: http://www.colorado.edu/hazards/

(because resources are shared and duplicated efforts are avoided) and politically savvy (because a wide range of groups are mobilized).

Disaster Typology

Despite a large body of disaster research, no universally accepted definitions of accident, emergency, disaster, or catastrophe exist. However, a disaster typology or continuum, based on "characteristics of the occasion", can be sketched out:

- Accidents:
  - a small proportion of the population is impacted;
  - a subsystem of the community or economic infrastructure is impacted (Perrow, 1999);
  - accidents are routine in nature;
  - training may or may not be routine, but relevant response organizations are familiar with the particular accident;
  - the length of victim and response involvement is brief;
  - resources for dealing with the accident are available
- Emergencies:
  - a larger proportion of the population is impacted;
  - a subsystem of the community or economic infrastructure is impacted;
  - emergencies are routine;
  - training is routine and relevant organizations may have experienced prior emergencies;
  - the length of victim and response involvement is relatively brief;
  - resources for dealing with the emergency are available;

- Disasters:
  - a larger proportion of the population is impacted and victims may exceed available resources (Ginter et al., 2006: 333);
  - disasters are nonroutine;
  - relevant response organizations may not have planned for the disaster;
  - the length of victim and response involvement is long-term;
  - resources may not be immediately available;

- Catastrophes:
  - most or all of the community infrastructure is heavily impacted and victims exceed available resources;
  - most, if not all, community or economic functions are interrupted;
  - catastrophes are nonroutine;
  - relevant response organizations may not have planned for the event;
  - the length of victim and response involvement is long-term;
  - local resources are diminished and assistance from nearby sources may not be available.

Accidents, emergencies, disasters, and catastrophes can appear suddenly or over an extended

period of time. However, Couch and Kroll-Smith (1985) make the case that disaster research has neglected slow moving, "chronic technical disasters". Chronic technical disasters are "slowly developing, extended, humanly produced deterioration in human system-ecosystem relations, in which an entire community or sectors therein perceive and/or incur danger to health and safety and the disruption of ongoing patterns of social and cultural relations" (Couch and Kroll-Smith, 1985: 566). One of the main dangers of slowly emerging disasters is that a lack of "a clear-cut and unambiguous reference point" to rally community/organization members may impede coordinated collective action (Couch and Kroll-Smith, 1985: 567).

The disaster studies literature has also attempted to address the issue of organizational response to stress. Brouillette and Quarantelli (1971) advance a typology of bureaucratic adaptation that amounts to a typology of structuration. Field data from the DRC revealed that bureaucratic structures change when confronted with a large number of demands and new structures and functions emerge. Brouillette and Quarantelli suggest a fourfold typology that transitions from an existing structure carrying out regular tasks (Type I), to a modification of the structure (e.g., new positions created) but a continuation of regular tasks (Type II), to a change in tasks but a continuation of the existing structure (Type II), and finally to a transformation of the structure and a change in its tasks (Type IV).

Normal Accidents and High Reliability

The publication of Charles Perrow's *Normal Accidents* caused a stir by positing that accidents are inevitable in any complex, tightly coupled system (1984). In the aftermath of Perrow's "normal accident" theory (1999 [1984]), disaster studies/risk management researchers scanned the horizon to find ways to minimize the frequency and severity of disasters. In studies of aircraft carriers, air traffic control systems, utility grid management, fire fighting teams, and other organizations, these researchers believe they have found examples of "high reliability organizations" (Drabek, 2005; Bigley and Roberts, 2001; Roberts and Bea, 2001; Bierly and Spender, 1995) and "high reliability networks" (Ginter et al., 2006) that "exhibit continuous, nearly error-free operation, even in multifaceted, turbulent, and dangerous task environments" (Bigley and Roberts, 2001: 1293). Researchers believe this

is the case because high reliability organizations (HROs) exhibit:

- a high level of domain consensus,
- 'big picture' communication and coordination,
- decentralized decision-making,
- extensive training (i.e., HROs spend disproportionately more money than other organizations training people to recognize and respond to anomalies [Roberts and Bea, 2001: 72]).
- aggressive information seeking (i.e., finding out what the organization does not know), and
- strong leadership.

For example, over the course of the development of America's nuclear submarine fleet, Bierly and Spender report that Admiral Rickover's "insistence on each individual's ownership of the task, responsibility, attention to detail, high professionalism, moral integrity, and mutual respect created the cultural context necessary for high quality communications under risk and high stress conditions" (1995: 651). Hage also notes that decentralization, horizontal communication, and shifting leadership help to facilitate the implementation of innovations (1999: 603).

Incident command systems (ICS), which provide the "efficiency and control benefits of bureaucracies" while avoiding the inertia of bureaucracies, are frequently a component of HROs (Bigley and Roberts, 2001: 1281). ICSs are characterized by three main features: 1) a structuring mechanism that establishes the ICS at the beginning of an incident, and also allows for the possibility of "role switching" (i.e., the reassignment of personnel) and "authority migration" (i.e., the decoupling of authority from hierarchies to individuals who possess the most expertise); 2) support for constrained improvisation; and 3) a "cognition management" methodology that devotes considerable attention and resources to developing, communicating, and connecting individuals' understandings of the situation (1286-1291).

Drabek's recent research uses a bounded rationality approach to theorize that emergency response managers are constrained to act under conditions of uncertainty and incomplete information. However, surveys administered to 62 emergency managers identified seven factors that best predicted the perceived and actual effectiveness of multi-agency response and community response:

1) a high level of domain consensus;
2) the use of more coordination strategies by the local emergency manager during the response;

3) a lengthier period of warning before the disaster took place (e.g., a hurricane warning system);
4) more frequent disaster trainings and actual responses to disasters within the previous two years;
5) more frequent participation by the emergency manager in local service organizations;
6) a high community growth rate;
7) use of more managerial strategies by the emergency manager during the previous year (2005: 49).

Of particular interest to this dissertation, Drabek finds that "as major threats approach, those most effective in their jobs, will use a series of coordination strategies with which to facilitate the emergence of a multi-organizational network through which appropriate resources can be directed toward the demands generated by a disaster event" (2005: 51). Drabek concludes by stating that "certain processes, namely key managerial and coordination strategies, can influence response effectiveness as do certain structures, like emergency operations centers" (2005: 68).

Research summarized by Ginter et al. adds that "the ability to respond effectively to large-scale disasters is beyond the capability of a single organization or institution" and that "Effective disaster prevention, detection, containment, and response require a network of agencies and organizations that function as a single, high-reliability organization" (2006: 332). In general, organizations (i.e., governments, communities and businesses) have not developed high reliability networks because "there has been no relevant model to guide their development" (2006: 338), but lessons learned from high reliability organizations (e.g., air traffic control towers) indicate that 'big picture' communication, decentralized decision-making, extensive training, aggressive information seeking, and strong leadership are necessary.

Natural Disasters and Ecological Disasters

The contributions of disaster studies have overwhelmingly pertained to earthquakes, tornadoes, floods, hurricanes, and technical disasters, with less focus on ecological events such as peak oil and climate change. Ecological problems are distinguished from other types of problems in their origin (e.g., slowly developing), duration, and impacts (Quarantelli, 1993b), but "older, less environmentally oriented thinking in the specialty" has been the norm until recently (Aguirre, 2002b). Miletti's *Disasters by Design* (1999), for example, encourages adopting sustainable development as

the key framework for disaster mitigation moving forward. Aguirre (2002a) also identified a "collective surge" in the number of sustainable development themed publications in the disaster studies literature during the late 1980s and early 1990s. However, the recent intersection of the sustainable development literature–with its emphasis on ecological problems–and the disaster studies literature has not been unproblematic, with Aguirre observing "in some important respects sustainable development is an intellectual product of professionals in north countries, reflecting their way of life and ideologies (2002b: 120). Aguirre also fears that the ideological bent and "grandiose emphases" of sustainable development will divert attention away from urgent, on-the-ground needs.

Disaster Studies Summary

► With disaster studies we get a field of study concerned with substantial damage to societies that identifies humans as the cause of- and solution to- accidents, emergencies, disasters and catastrophes. The disaster studies literature identifies qualities of effective ('big picture' communication, decentralized decision-making, extensive training, aggressive information seeking, and strong leadership) and ineffective (inadequate communication, centralized decision-making, lack of training, aggressive information seeking, and weak leadership) responses. Disaster studies also presents a typology of bureaucratic adaptation to stressful situations that is very similar to the theory of structuration, in the sense that structural change is possible as a result of improvised, "creative action in context" (Medonça and Wallace, 2004). To the question posed at the end of Section 3.1, we can now say that social structures that devote resources and formal/informal rules to organizational learning, communication, coordination, role switching, training/planning, authority migration, leadership, etc., will tend to be more reliable at preparing for, mitigating against, and adapting to natural, technical and ecological accidents, disasters, emergencies, and catastrophes. Research questions therefore attempted to ascertain if these characteristics were evident in Vermont's state government.

3.3. Organizational Theory

Bounded Rationality

A rational decision-making model might predict that societies would be aggressively planning for a petroleum constrained future while simultaneously striving to reduce their greenhouse gas emis-

sions. To date, this has not been the case in Vermont, and for good reason: The sociological literature on organizational theory has consistently debunked the idea of rational decision-making. Early work by James March and Nobel Prize winner Herbert Simon (1994 [1958]) suggested that humans frequently operate under conditions of unclear preferences, incomplete information, and unknown consequences, and are consequently concerned with making satisfactory choices, rather than utility maximizing ones. For March and Simon, the bounds of decision-making are shaped by organizational and social environments, leading to "repertories of action programs" that serve as "alternatives of choice in recurrent situations" (1994: 150).

Much of the subsequent work on organizational theory is some variation of the **bounded rationality** model (see Buchanan and O'Connell, 2006, for a helpful review). For example, the **garbage can** model predicts that a decision is an "outcome or interpretation" that reflects some combination of problems, solutions, participants, and choices (Cohen et al., 1972: 3). The "Organizational structure impacts outcomes by affecting the time pattern of the arrival of problem choices, solutions, or decision makers; by the determining the allocation of energy by participants; by establishing linkages among the various streams" (Cohen et al., 1972: 4). One implication of the garbage can model is "problem latency": a problem can be actively considered within an organization without being connected to a choice (Cohen et al., 1972: 4). That is, although the garbage can model tends to solve important problems, it also sets up a queue of problems to be solved, potentially to the disadvantage of newer problems.

Economic sociologists have also criticized the premise that rational, self-interested actors know best how to allocate their time, energy, and money, and that the interplay between actors leads to the optimal utilization of resources and the most efficient economy. In contrast, economic sociologists point out that economic behavior (whether individual or organizational) is embedded in a web of social relations (Granovetter 1985), which means that it is influenced by norms, institutions, and socio-cultural dynamics.

The Iron Cage

Weber and many others have warned that "a society dominated by organizations imbued with legal-rational authority would suffer negative consequences" (Vaughan, 1999: 271). Research in the Weberian "iron cage" tradition has examined the structure of bureaucracies and their impact of on decision-making. For example, Blau's work describes how four characteristics of bureaucracies–specialization, a hierarchy of authority, a system of rules, and impersonality–"create social conditions which constrain each member of the organization to act in ways that, whether they appear rational or otherwise from the individual standpoint, further the rational pursuit of organizational objectives" (Blau, 1956: 32). Powell and DiMaggio's (1983) **new institutionalism** asserts that the bureaucratization of organizations in modern society is complete, but organizations are not necessarily more efficient. Rather, Powell and DiMaggio observe a phenomena of "institutional isomorphism", whereby organizations mimic the structure of other organizations in the hopes of gaining legitimacy. Ritzer has referred to this phenomenon as the "McDonaldization" of society (2000). Because the structure (generalized rules and resources) of the mimicked organization can be inappropriate to solving specific problems, "outcomes may be suboptimal" (Vaughan, 1999: 276).

Selection and Adaptation

Similar to the Chicago School's adoption of ecological analogies, Hannan and Freeman (1977) advance the proposition that it is more likely that the environment of organizations **selects** for fit organizations, rather than organizations adapting to environmental niches. Hannan and Freeman suggest that this is the case because the ability of organizations to adapt is constrained by internal and external sources of inertia:

- sunk costs (e.g., infrastructure, equipment),
- internal and external constraints on the flow of information,
- organizational history, including normative agreements that "preclude the serious consideration of many alternative response" (1977: 931),
- legal and fiscal barriers,
- legitimacy constraints,
- and the "collective rationality" problem (1977: 932).

From this perspective, the creation of new organizations and the destruction of old ones accounts for most of the variability among organizations, and not the ability of organizations to transform themselves.

Social Representations

Research with a cultural slant stresses looking at decisions and decision-making in organizations as examples of "social representation" (Laroche, 1995: 62; similar to Goffman's impression management). That is, personnel use the phrase "decision-making" to represent an organizational process that either leads to decisions (a "self-fulfilling prophecy"), serves as an illusion for real activity, or is used to rationalize some activity after the fact (Laroche, 1995: 69-71). Howard-Grenville's recent study found that "organizational culture influences how an organization's members define, or 'set,' problems and the strategies they draw on to solve such problems." In particular, "the relative power of the subcultures [within an organization] influences which interpretations and strategies for action are ultimately adopted" (2006: 42). Consequently, variation in "problem setting" and "strategies for action" are evident between subcultures. In general, elected officials such as Governor Douglas and the Legislators make social representations to their constituencies that generally emphasize problem-solving and opportunities, rather than dire potentials.

Intuition

According to **prospect theory**, developed by behavioral economists Amos Tversky and Nobel Prize winner Daniel Kahneman, "Rational models are psychologically unrealistic" (2003: 1449). Alternatively, experiments demonstrated that people make decisions based on automatic, effortless, emotional, habitual **intuitions**. Intuitive decisions are "skilled, unproblematic, and reasonably successful" (Kahneman, 2003: 1467) because they are based on accessible reference points or prototypes of past experiences. Prospect theory suggests that people can be simultaneously risk averse and risk seeking depending on their frame of reference but that, in general, people accept frames unproblematically. Reasoning, which refers to slow, controlled, effortful, rule-governed decision-making, is described as an attribute of *experienced* decision-makers.

For example, Grant (2007) points out that, with the possible exception of Cuba, no current society has experience dealing with a "once-in-history" event like peak oil. Grant uses the example of heart attacks to suggest that it is difficult to convince people who have never had one to watch what they eat and exercise- it may not be intuitive. As noted in Chapter 2, a similar argument based on anticipation and perception was advanced by Diamond (2007) to explain decisions that eventually led to collapse for several past societies. In 2006 Governor Douglas was embarrassed in on a Vermont Public Radio call-in show when he admitted not knowing what peak oil meant- the concept was not accessible to him at the time. Additionally, it is difficult for HROs and HRNs to form in the absence of practice, but it is the case that Cuban activities such as increased bicycle use and the substitution of oxen for tractors provide a starting point. Alternatively, "The more frequently we encounter an event, the more practice and feedback we receive, and the more effective our behavior becomes (Grant, 2007: 72).

The Environment of Organizations - Organization Characteristics - Cognitive Practices

Diane Vaughan's (1999) work on the **normalization of deviance** within organizations nicely summarizes research on structuration, disasters, and organizational theory. Among other things, the normalization of deviance refers to the suppression of mistakes, the denial of responsibility, the violation of rules, and the neutralization of signals of danger. Vaughan's research on the Challenger space shuttle explosion identified a system of nested and dynamic relationships that produce routine nonconformity. This system is composed of:

> **A) the environment of organizations** (e.g., uncertainty about the future)
> **B) organization characteristics** (e.g., competition for resources)
> **C) the cognitive practices of individuals within organizations** (e.g., lack of recognition of problems). [1999: 274].

More broadly, these three characteristics of any organizational system encapsulate the range of influences and factors that influence decision-making for good and ill. For the duration of this paper, I use these concepts as framing vehicles for identifying and grouping the range of factors that help to explain or disprove my thesis that Vermont's state government is not acting like and

HRO. For example, **the environment of organizations** now refers to concepts such as institutional isomorphism, embeddedness, and selection. **Organization characteristics** refer to concepts such as social structures, subcultures, and accessible frames or schemas. Finally, **the cognitive practices of individuals within organizations** Finally, the cognitive practices of individuals within organizations assumes contexts of bounded rationality, where decisions are made based on available garbage cans, intuitions, concerns, etc.

Critiques of Organizational Theory

In a critical review of organizational theory, Perrow (2000) suggests that how organizations function has received the most attention in the literature, but the growth of business schools has "shaped decisively" the field toward an emphasis on economic efficiency. From Perrow's perspective, the scholarship from business schools "swamped the stagnant...programs" in the social sciences to such an extent that the influence of the social sciences will be limited for the foreseeable future (471). Starbuck adds "Thanks to the popularity of business education, organization theory has been living in a self-indulgent state in which external impacts have little or no impacts" (2000: 448). He suggests that organization theory regain its relevance by attempting to contribute to improving human welfare. Along these lines, Shrivastava argues that organizational theory's ideas of organizational "environments" are "narrow, economistic, and anti-naturalistic" (1994: 711). Finally, Kallio and Nordberg (2006) note an increase in the number of organization and environment publications since the early 1990s but are disappointed by their perception of

> "*...environmental research that is not real environmental research (because the ecology aspect is more or less absent), and environmentalism that is not real environmentalism, because the economic growth mantra and other basic values of the parent discipline continue to dominate the discourse, regardless of the pro-environmental personal values of many O&E* [organization and environment] *scholars" (451).*

Organizational Theory Summary

► In summary, the organizational theory literature provides key insights that help to explain why Vermont's Executive Branch (composed of the Governor, Lieutenant Governor and several state Agencies) and Legislature might not be acting reliably to prepare for, mitigate against, and adapt

Vermont to peak oil and climate change. Collectively, the environment of organizations, organization characteristics, and the cognitive practices of individuals within organizations can support or undermine the development of HROs and HRNs. For example, peak oil and climate change may not be ideologically salient to government workers. It may be the case that solutions to climate change and peak oil are not intuitive to some government employees, or the garbage can they usually draw from to solve problems does not provide guidance when it comes to solutions to peak oil and climate change. Research questions attempted to identify what aspects of the state government's environment, what organizational characteristics, and what cognitive practices stood in the way of Vermont's government performing like an HRO.

3.4. Political Sociology

Power, which refers to the ability of some people and organizations to get their way against the will of others (or with the consent of others) is the main concept wrestled with in political sociology. For example, Foster points out that the issue of wood "theft" helped Marx to see the extent to which poor people were denied access to nature—even for their survival—by the institutions of private property (2000: 67). The crux of Marx's body of work was consequently centered on the alienation of workers from the fruits of their labor from elites. Tilly (1999) theorizes that power elites secure and enhance rewards from resources through exploitation and opportunity hoarding. Exploitation operates when powerful, connected people command resources (natural and human-made) from which they draw significantly increased returns by coordinating the efforts of outsiders, whom they exclude from the full value added by that effort (1999: 10).

G. William Domhoff suggests using four indicators of power–Who benefits? Who governs? Who wins? Who shines?–but his answer to all of the above is "a relatively fixed group of privileged people" who flex their power to shape the economy and government (1998: 1). For C. Wright Mills, the U.S. "power elite" consisted of political, economic, and military elites united in an 'uneasy' alliance to promote upper class values, defense spending, and the socialization or continuation of dominance from one generation to the next (1970 [1956]). For Domhoff, the power elite consists of an 'uneasy' alliance between the social upper class, the corporate community, and policy formation

organizations (e.g., the Wednesday meetings at Americans for Tax Reform identified by Medvetz, 2006) who share a dislike for most government programs except defense spending.

Domhoff suggests that members of the power elite enter into politics in the context of a corporate-conservative coalition with the Republican Party (1998: 3). The political platform of the corporate-conservation coalition/Republican Party revolves around a moral order premised on religious values (e.g., anti-abortion), a strong anti-tax, anti-New Deal, 'free market' perspective, and a muscular foreign policy (Domhoff, 1998; Medvetz, 2006). Frank (2004) argues that Republican Party has dominated American politics for the past 30 years because they have convinced lower and middle class people to vote against their own economic interests in order to defend traditional cultural values against the ideology of the "liberal-labor coalition." According to Domhoff, the liberal-labor coalition consists of challengers to the power elite such as union members, academics, minority community groups, environmental organizations, and the liberal wing of the Democratic Party (1998: 5-6). The corporate-conservative coalition and the liberal-labor coalition square off in the political arena over the level of government involvement in everything, including the scope of social and environmental benefit programs and conservative versus liberal values.

Bartels (2005) argues that the situation is muddier than Frank's (2004) portrayal of the Republican Party's ascent. Testing Frank's thesis, he asks: Has the white working class abandoned the Democratic Party? Has the white working class become more conservative? Do working class "moral values" trump economics? Are religious voters distracted from economic issues? To each question he answers "No", and suggests that the real takeaway message is that neither party can stand pat on where it finds support. The situation is even muddier in Vermont where, in 2006, U.S. Representative Bernie Sanders (a socialist) handily defeated multi-millionaire Rich Tarrant in a U.S. Senate campaign, a Democrat majority was solidified in both houses of the Legislature, and Governor Douglas trounced the Democratic candidate, Scudder Parker. Governor Douglas had the support of 92 percent of Republicans and *31 percent* of registered Democrats according to one Rasmussen Report (August 2006). Even though they ran with completely opposing agendas, both Sanders and Douglas had over 70 percent favorable ratings in the same Rasmussen Report. How Governor Douglas was

elected to office in 2002 and re-elected in 2004 and 2006 in such a strong Democratic stronghold is not entirely clear, although his *likability* is frequently noted.

Governor Douglas–who appoints Agency Secretaries, board, and commission members, as well as making budget recommendations and wielding veto power–has made an "Affordability Agenda" the centerpiece of his Administration. The components of the Affordability Agenda are a plan to cap property taxes, reduce health care costs and make home-ownership and higher education more affordable. Climate change has been a peripheral concern to the Affordability Agenda, but, Governor Douglas has advanced four main climate change policies that all exemplify the "economic desirability vs. political feasibility" conundrum (Raab, 2007a). That is, even low emissions/high policy states have avoided carbon tax legislation in favor of more palatable renewable portfolio standards and cap and trade systems. The Governor has advanced no peak oil specific policies as of yet. Jimmy Carter, the first President to seriously talk about energy has been lampooned ever since. With the exception of U.S. Representative Roscoe Bartlett, few politicians are talking about peak oil.

In 2003, Executive order #14-03 established a Climate Neutral Working Group (CNWG)[15] composed of state Agencies and Departments "tasked with coordinating, documenting, and encouraging efforts to meet Vermont's greenhouse gas emission reduction goals." In 2005, Governor Douglas signed on to the Regional Greenhouse Gas Initiative (RGGI)[16], a cooperative effort by Northeastern and Mid-Atlantic states to reduce emissions of carbon dioxide from power plants through a market-based "cap-and-trade" program. Also in 2005, Governor Douglas' Executive Order 07-05 established a Commission on Climate Change[17] that is producing an inventory of existing and planned actions that contribute to greenhouse gas emissions and ways that Vermont can avoid those emissions. Act 168, signed into law by Governor Douglas in 2006, stipulates that Vermont will reduce its emissions of greenhouse gases from the 1990 baseline by 25 percent by January 1, 2012, by 50 percent by 2028, and, if practicable using reasonable efforts, by 75 percent by January 1, 2050.

The results of these efforts have not been substantial to date. The second biennial CNWG report found that "It is apparent that Vermont state Government is faced with a substantial challenge

15 Url: http://www.anr.state.vt.us/air/planning/docs/cnwg%202nd%20%20Biennial%20Report%204-2007.pdf
16 Url: http://www.anr.state.vt.us/air/htm/RGGI.htm
17 Url: http://www.vtclimatechange.us/

to reduce energy consumption and CO_2 emissions consistent with the goals" of #14-03. Emissions related to building space heating and building electricity consumption increased, while state vehicle fleet emissions decreased slightly from 2005 to 2006, mainly due to the purchase of 25 Honda Civic hybrids. However, the CNWG does not expect to see any emissions reductions in employee commuting, since no programs or incentives have been developed. Since Vermont does not have heavily polluting industries or electricity generation, it stands to gain in the RGGI process by trading its carbon credits. How long this situation will last is unclear since the Center for Climate Strategies, the organization hired to facilitate the Governor's Commission on Climate Change, projects that even under a low emissions scenario, Vermont's emissions will exceed its carbon sinks from 2012 through 2030, *if* the state does not pursue new demand side management programs. Meeting the goals of Act 168 will be challenging, as emissions continue to rise each year. Finally, the Commission on Climate Change, chaired by Ernest Pomerleau, the largest developer in the state, has been underway for a little less than a year. A Climate Change Action Plan "consistent with Vermont's need for continued economic growth and energy security" was meant to be submitted to the Governor by September 1, 2007. In short, very little is being asked of Vermont's state Agencies in terms of preparing for, mitigating against, and adapting to climate change.

In contrast, the Democratically-controlled Legislature–which makes budget appropriations and designates tasks to be accomplished by Agencies and Departments–made combating climate change the centerpiece of the 2007 Legislative session. National (e.g., Amory Lovins) and state (e.g., Bill McKibben) climate change experts were brought in to educate the Legislature and the public on the peril and opportunity of climate change. The House looked at how to create more in-state, renewable electric sources, while the Senate examined ways to increase efficiency, especially in terms of heating. A bill combining these features, H.520[18], passed in 2007, with goals such as producing 25 percent of Vermont's energy from renewable sources by 2025, revising commercial building energy standards, expanding Vermont's net metering program, and all fuels efficiency modeled on Efficiency Vermont. House Bill 520 was a topic of heated debate in 2007 due to the source identified to fund the all fuels efficiency. The bill originally sought to create a heating fuels efficiency utility to reduce

18 Url: http://www.leg.state.vt.us/docs/legdoc.cfm?URL=/docs/2008/bills/passed/H-520.HTM

the use of heating fuels by levelling a small surcharge on heating bills. The surcharge would then be used to fund weatherization activities so that homes and businesses would consume less heating oil. When Administration opposition to the surcharge proved insurmountable, the Legislature switched to a new tax on Vermont Yankee (Vermont's nuclear reactor) to fund the program. H.520 was endorsed by environmental groups such as Vermont Public Interest Group and the Vermont Natural Resources Council, business support from Vermont Businesses for Social Responsibility (the largest organization of its kind in the United States), and support from Vermont's Congressional delegation. The bill was opposed by the Vermont Fuel Dealers Association, Associated Industries of Vermont, the Department of Public Service (the organization responsible for state energy planning) and by Governor Douglas, who exercised his veto power.

In early June 2007 Al Gore publicly endorsed Vermont's legislation and encouraged the Democrat-led Legislature to override the veto. "This legislation would position Vermont at the forefront of this growing global movement," Gore said, "I hope you get this override and put this terrific law into place." Governor Douglas is quoted as saying "Unfortunately, they choose to ignore my point of view," while Senator Pro Tem Peter Shumlin is quoted as saying that engaging Governor Douglas on climate change "has been a challenge, to put it mildly." To an alternative proposal put forward by Governor Douglas, Shumlin adds, "I feel a little bit like the bride who never saw the diamond. If that was a proposal, he made it in the most shy and understated way" (Porter, 2007a). On July 11, 2007, Vermont's Legislature reconvened but failed to override the Governor's veto. The Legislature has likewise not introduced peak oil specific legislation, although H.520 would have served the purpose of reducing oil dependence.

Political Sociology Summary

► Although Vermont voters have been somewhat 'schizophrenic' in their voting patterns, Vermont's political parties have largely adhered to designations noted by Domhoff. For example, Governor Douglas is against any new taxes/surcharges such as the one that would have been applied to Vermont Yankee. Consequently he vetoed H.520. Alternatively, he has pushed for voluntary type programs. The intuitive responses or accessible frames that some government employees possess, there-

fore, may preclude certain courses of action on peak oil and climate change. If Vermont's Agencies and Departments are not tasked by the Governor and/or Legislature with helping the state to prepare for, mitigate against, and adapt to peak oil and climate change, then acting reliably to address these is difficult.

3.5. First Synthesis: Contributions of Mainstream Sociology

Examples such as Governor Douglas' veto of House Bill 520 led me to hypothesize that Vermont's state government is not acting reliably to help Vermont prepare for, mitigate against, or adapt to peak oil and climate change. After examining several types of literature from mainstream sociology, a model that helps to explain this lack of cooperation begins to emerge (see also Page 20):

► **The environment of organizations:** Hannan and Freeman's description of external sources of inertia that constrain the ability of organizations to adapt and Powell and DiMaggio's assertion that organizations become more similar over time might help to explain a lack of problem-solving innovation within Vermont's state Agencies. Each Agency is structured to address specific topics (e.g., Economic Development, Agriculture, Human Services). The effect of this bundling of resources and cultural schemas into specific Agencies is to create silos that may not be equipped to coordinate under normal circumstances, and certainly not equipped to coordinate around complex, emerging problems such as peak oil and climate change. Vermont's Legislature is overwhelmingly Democratic, while Governor Douglas is a Republican, and his Agency Secretary appointments are also Republicans. Partisan politics is a barrier to coordination. This has especially been the case with H.520, a Legislature-driven effort to introduce sweeping changes in energy policy in Vermont that has been opposed by the Department of Public Service and Governor Douglas.

► **The cognitive practices of individuals within each government organization:** It is possible that some government employees have no knowledge of peak oil and climate change, or fall under the category of peak oil or climate change "contrarians" (McCright, 2007), that is, they doubt that peak oil and climate change are problems. Following Kahneman, it also seems possible that solutions to climate change and peak oil are not intuitive to some government employees, or the garbage can they

usually draw from to solve problems does not provide guidance when it comes to solutions to peak oil and climate change. Likewise, the intuitive responses or accessible frames that some government employees possess may preclude certain courses of action on peak oil and climate change (e.g., Governor Douglas is against any new taxes such as the one that would be applied to the nuclear reactor Vermont Yankee). These intuitions may be accepted without problem, even with the scale of peak oil and climate change. According to Laroche, the social representation of decision-making on peak and climate change and coordination among Agency personnel, the Governor, Lieutenant Governor, and the Legislature may be a performance for certain audiences.

► **Organizational characteristics:** Using Sewell's update of Giddens theory of structuration, each Vermont government organization is viewed as a social structure composed of resources and cultural schemas or tool-kits. The combination of resources and schemas frames the contours of each organization's capacity for action. Organizational resources such as roles, budget size, number of personnel, staff expertise, and other factors, vary by Agency. Organizational schemas or culture varies by the repertories of action, tool-kits, intuitions, frames, and other cognitive practices that employees bring in based on past experience, as well as organizational history. The combination of resources and schemas within an organization may support or undermine the development of high reliability networks to address peak oil and climate change. For example, a subculture within a particular Agency may be well versed on the topics of peak oil and climate change, but a lack of resources or influence may limit their ability to facilitate coordination and action. The structure of each organization identifies which personnel are going to be involved, and defines the intent, purposefulness, timing, duration, scale, responsibility and form of preparedness, mitigative, and adaptive measures. Internal sources of inertia, such as sunk costs and organizational culture may also inhibit coordination.

Taken together, these mainstream sociology literatures identify some key factors in the environment of organizations, within the cognitive practices of individuals, and in the characteristics of organizations that could help to explain Vermont's state government's lack of coordination to prepare for, mitigate against, and adapt to peak oil and climate change. However, except for disaster studies, these literatures are basically silent regarding the ecological basis for social functioning. The absence

of ecological variables–again, except for disaster studies–to explain social phenomena is particularly glaring in the cases of peak oil and climate change, namely because oil use and the Earth's climate are vital, pervasive facts of life *and* because they are the two most significant ecological problems facing societies. A lack of understanding of societal-ecological interactions may be at the root of our collective inability to address peak oil and climate change. Consequently, I now add in the contributions of human ecology and environmental sociology to help situate the problems of peak oil and climate change and to explain a lack of reliability in addressing these problems.

3.6. Human Ecology & Environmental Sociology

In what amounts to environmental sociology's manifesto, Catton and Dunlap (1978, 1979, 1994a-b) explicitly critiqued the disciplinary blinders endemic in sociology regarding the natural environment. They suggested that "ostensibly diverse and competing theoretical perspectives in sociology are alike in their shared anthropocentrism." This anthropocentrism is described as part of a basic sociological worldview that they called the 'human exceptionalism paradigm' (i.e., humans are unique amongst Earth's species because of culture). This term was later reframed as the **human exemptionalism paradigm** to indicate that although our brains and culture make humans unique, we are not exempt from ecological laws. Catton and Dunlap suggested that sociology had to take seriously a dilemma traditionally neglected—human societies necessarily exploit surrounding ecosystems in order to survive, but societies that overshoot the carrying capacity of their ecosystems may destroy the basis of their own survival.

According to Dunlap and Catton, it was originally thought that in order for sociology to differentiate and establish itself from other disciplines "sources of variation in human behavior patterns" (1979: 245) other than social forces had to be de-emphasized. If "social facts can be explained only by other social facts" (1979: 244), what would it matter that genes might constrain or enable individuals in specific and important ways or that geographical conditions might have played a critical role in the differing fates of human societies? For sociologists, the term environment came to refer to social structural and cultural influences upon behavior, as it still does for many of the sociological literatures cited previously. Dunlap and Catton famously summarized the impact of disciplin-

ary traditions on sociology's treatment of the physical (i.e., from more or less natural to modified environments to built environments) environment as follows: "The Durkheimian legacy suggested that the physical environment should be ignored, while the Weberian legacy suggested that it could be ignored, for it was deemed unimportant in social life. Should one violate these traditions and suggest that the physical environment might be relevant for understanding human behavior or social organization, one risked being labeled an environmental determinist" (1983: 118).

Buttel (1976) turns this equation on its head by arguing that the contributions of classical theorists have been neglected by environmental sociologists because most sociologists have limited acquaintance with the full range of the classical theorists' primary writings and have learned the classical tradition through secondary treatments by sociologists with little or no interest in environmental and biological phenomena. In fact, early notable sociology heavyweights—Auguste Comte, Herbert Spencer, Emile Durkheim—borrowed ideas from biology and Darwin and applied them to human societies. Darwin's explanation for speciation—evolution by natural selection—helped Durkheim to explain social speciation, or the division of labor in society: the combination of forces that increase the "material density" of a population (e.g., immigration and population growth) with forces that reduce the "social space" between people (e.g., improvements in transportation and communication) leads to increased competition or the division of labor between people. From Durkheim's perspective, the division of labor serves to reduce competition and support cooperation as people find their own niches and exchange resources with people from other niches (Turner, 1998: 82).

Other early scholars eschewed metaphors to describe human-environmental interactions. Foster (1999, 2000) adds Marx's lesser-known theory of "metabolic rift"—i.e., "the material estrangement of human beings within capitalist society from the natural conditions which formed the basis for their existence" (2000: 163)—to Darwin's well-known theory of natural selection to demonstrate how the development of materialism and science from the 17th to 19th centuries made ecological ways of thinking possible for Western societies. Way back in 1932 Radhakamal Mukerjee wrote in the *American Journal of Sociology* (based at the University of Chicago) that "The cultural order is woven within the skeleton of the ecological order (350); that "The work and welfare of humans depends

to a large extent to the cycle of life processes of the region" (349); and that our future "depends upon a bio-economic cooperation based upon a scientific comprehension of the complex web of life that comprises both the living and non-living realms. He [sic] must also cultivate a new humility and foresight in the interest of unborn societies of the future" (1932: 349).

Drawing on Spencer, Durkheim, Darwin, and other biologists and ecologists, the Chicago School (circa 1915 to 1940) also used biological and ecological analogies (e.g., the web of life, competition, selection, dominance, invasion) to describe a kind of sociocultural ecosystem, or, the human ecology of Chicago. Park suggested that the city is "the natural habitat of civilized man" (Park et al., 1984 [1925]: 2). We can appreciate the impact of ecological ways of thinking in the following quote from Park's colleague, McKenzie (1924): "The plant ecologist is aware of the effect of the struggle for space, food, and light upon the nature of a plant formation, but the sociologist has failed to recognize that the same processes of competition and accommodation are at work determining the size and ecological organization of the human community" (288).

However, modern day environmental sociologists are particularly critical and dismissive of the contributions of the Chicago School. Beus (1993) asks: "Why was environmental sociology necessary to begin with, given the fact that sociological human ecology has existed for 70 years?" His answer: because "sociological human ecology had become so distorted that it could not (or would not) deal with the societal-environmental issues raised with the advent of the environmental movement. The irony need hardly be restated. Human ecology, the study of humanity's interaction with its environment, missed the proverbial boat" (Beus, 1993: 117). The phrase "sociological human ecology" is used derisively to designate the fact that it is not *real* human ecology (real human ecology is now called environmental sociology). Catton adds "Sociological human ecology has damaged itself by focusing its studies so largely on urban complexes and substantially disregarding nonhuman and nonartificial ecosystem components, sociological human ecology has seemed to support the notions that humans (collectively if not individually) are exempt from ecological principles that apply to other types of organisms" (1994: 78).

In 1944 Hawley foreshadowed modern environmental sociology's criticism of sociological human ecology by citing its "failure to maintain a close working relationship between human ecology and general or bioecology" (399). Hawley writes that "Culture is nothing more than a way of referring to the prevailing techniques by which a population maintains itself in its habitat…In simplest terms, human ecology is the descriptive study of the adjustment of human populations to the conditions of their respective physical environments…Human ecology, then, may be defined more fully as the study of the development and the form of communal structure as it occurs in varying environmental contexts" (1944: 404). Although Hawley notes that the city represents the fullest expression of human dominance of nature, he is also aware of the fact that "Nothing in the rising tide of civilization has altered the fact of man's dependence on the organic as well as on the inorganic elements of the environment" (1950: 55). Martinez-Alier (1987), Fischer-Kowalski (1998, 1999), and Foster (2001) all make the case that an economics and sociology based on the flow of energy and materials through societies (i.e., an economics that "internalized externalities") could have been established many decades ago if the works of Wilhelm Ostwald, Marx and Engels, Frederick Soddy, Sir Patrick Geddes, Serhii Podolinsky, Eduard Sacher, Lewis Mumford, Fred Cottrell and others had been seriously considered by social scientists.

Freudenburg and Gramling (1989) advance four rationales for why these works were not seriously considered by social scientists:

1) American sociologists have been socialized to accept a man-versus-nature worldview,
2) American sociologists rejected Social Darwinism and other perceived deterministic explanations
3) The dominate social theorist after World War II, Talcott Parsons, developed a macroscopic sociological theory almost exclusively on social explanations of human behavior.
4) A microscopic sociological theory bias–social constructionism–also developed after World War II.

In any event, it seems likely that social scientists were historically blinded by the human exemptionalism paradigm *and* the ecological contributions of some social scientists were ignored *and* sociological human ecologists used metaphors *and* developments in the field of sociology after World War II ignored natural ecology *and* rising concern about environmental problems made it necessary

for environmental sociology to develop in the late 1970s. It was against this backdrop that environmental sociologists have concerned themselves with attempting to answer two reciprocal questions:

► How do interdependent variations in human population, technologies, cultures, social systems, and 'personality systems' (or social psychology) influence the natural environment?

► How do resultant changes (and other non-anthropogenic variations) in the natural environment modify human populations, technologies, cultures, social systems, and personality systems, or any of the interactions among them? (Dunlap and Catton, 1979: 252; Buttel, 1976).

As the field of environmental sociology has blossomed, several themes, theories, and schools of thought have attempted to answer these questions. The next several sections review the human exemptionalism paradigm, the realist-constructionist debate, the treadmill of production, the risk society, ecological modernization, Stern's theory of environmentally significant behavior, and Lutzenhiser's concerns-capacities-conditions model.

The Human Exemptionalism Paradigm

In his exploration of ancient civilizations in the Mediterranean region, J. Donald Hughes (1975) found that religious beliefs (e.g., Christian, Jewish, Islamic) and values (Greek and Roman rationality) led to severe ecological degradation. Religious beliefs about human dominion over nature, coupled with beliefs about the "plasticity" of nature (Murphy, 1994) form core components of Catton and Dunlap's human exemptionalism paradigm. The major assumptions of the human exemptionalism paradigm are that

1) humans are unlike all other species,
2) social and cultural factors determine human affairs,
3) the biophysical environment is largely irrelevant, and
4) all problems are ultimately solvable due to technological and social progress (Dunlap and Catton, 1994b: 16).

Since humans have succeeded in taking over increasing portions of the earth's total carrying capacity numerous times at the expense of other species, Catton (1982) reasons, humans have developed the mistaken belief that they could overshoot carrying capacity and live to tell about it. Our current "Age of Exuberance," which Catton defines as the "delusion of human exemptionalism" (58) was only possible because of two non-repeatable events: the "discovery" of North and South America and the use of fossil fuels (5-6). Consequently, human societies are said to have overshot the carrying

capacity of the Earth.

Catton referred to fossil fuels as "phantom carrying capacity" (1982: 41) since they temporarily expand the carrying capacity of the planet. Hubbert wrote that America had developed an "exponential growth culture" (1976: 125) that stands in the way of dealing with peak oil and prudent energy use. In both cases, Catton and Hubbert are referring to the delusion of human exemptionalism. For example, 75 percent of Vermont commuters drive alone to work (VPIRG, 2005).

While it seems unlikely that many people unthinkingly accept assumptions 2 and 3, Catton argues that people differ in their readiness to understand that the Age of Exuberance has ended and that "inexorable consequences" will follow (1982: 69). Consequently, a paradigm shift, from the human exemptionalism paradigm to the "new ecological paradigm" (i.e., humans are one species among many that are interdependent on biotic communities; feedback in the web of nature produces many unintended consequences from purposive human action; and, the world is finite) is necessary for human societies to survive.

The Human Exemptionalism Paradigm Summary

► In the context of Vermont's hypothesized lack of reliability to address peak oil and climate change, the human exemptionalism paradigm and its corollary, "cargoism" (i.e., technology will save the day), would thus appear to be components of the schemas that constitute governmental structures. In particular, one of the accessible frames or intuitions that some government employees may hold is that human ingenuity will solve the peak oil and climate change problems, thus down-playing the risk that they pose. Alternatively, an accessible frame, intuition, tool-kit, etc. that some government employees may hold is that resources are finite and that technology can not solve all problems. In either instance, except perhaps in the case of Governor Douglas, personally held schemas or paradigms are not enough to shape an entire organization's structure. Each schema needs to be connected to sufficient resources and be sufficiently widespread in order for it to be *the* organizational paradigm. Research questions attempted to ascertain if interviewees viewed these problems as risks, if they were concerned, and what action they thought needed to take place.

Realism vs. Constructionism

As with reliable supplies of oil, humans have come to depend on a relatively moderate climate. Unlike peak oil, social scientists have spent a fair amount of time researching climate change (Rosa, 2000; Rosa and Dietz, 1998). Rosa and Dietz argue that sociological research on climate change has cleavaged down two paths: realism and social constructionism. Down the realist path are models such as STIRPAT, which emphasizes that, for example, emissions are the result of an interaction between population, technology, and societal affluence. Or Tom Rudel's research on deforestation and reforestation, which looked at whether reforms in land policy could expand carbon sequestration and sustainable development opportunities in tropical regions.

The social constructionism path emphasizes both the uncertainties that "underpin scientific claims about climate change" and the social context that elevates climate change to prominence (Rosa and Dietz, 1998: 440). For example, McCright (2007) has studied how climate change contrarians mislead politicians and the general public about climate change by providing the pretext of accountability (i.e., the "dueling scientists scenario") even though they generally operate outside of the scientific community (cf. Union of Concerned Scientists, 2007). Contrarians benefitted from the Republican takeover of Congress in the 1990s, especially with Senator James Inhofe as chairman of the Environment and Public Works Committee. Ungar's study of social scares found that hot temperatures during the summer of 1988 provided enough of a panic that attention was focused on climate change. This surge in attention was short-lived, however, partly due to uncertainty about the anthropogenic origins of recent climate change, and partly due to the fact that social problems must compete for attention with other social problems (Williams and Frey, 1997).

The research of Ungar, Williams and Frey complements Couch and Kroll-Smith's finding that a lack of "a clear-cut and unambiguous reference point" during slowly emerging disasters impedes coordinated collective action to rally an effective response (Couch and Kroll-Smith, 1985: 567). In their description of the garbage can model, Cohen et al. refer to this as "problem latency." However, the research of Ungar and Williams and Frey, now twelve and ten years old respectively, and even the recent work of Leiserowitz (2006), which found that Americans have moderate risk

perceptions of climate change, are most likely out-of-date. Leiserowitz cited a study that found that Americans lack "vivid, concrete, and personally-relevant images of climate change" and his own research found that Americans perceive climate change to be a problem for geographically distant people and places (2006: 55, 62).

Climate change is not likely to slide into the background again due to Al Gore's *An Inconvenient Truth* (released in May 2006), the near destruction of New Orleans by Hurricane Katrina (which hit in 2005, but was not covered by Leiserowitz's article), incredible media attention surrounding both events, and coverage of images such as drowned polar bears. Additional embarrassments, such as the bad press the Bush Administration received for attempting to censor the work of top NASA climate scientist James Hansen (Revkin, 2006), and the 'outing' of corporate-funded contrarian campaigns to debunk climate change (Union of Concerned Scientists, 2007; McCright, 2007) have added strength to the concept. States (Peirce, 2006) and cities (e.g., the U.S. Mayors Climate Protection Agreement) are working hard to initiate greenhouse gas emission reduction programs. Additionally, the third IPCC report adds weight to the realist camp by asserting with very high confidence that humans are responsible for climate change. Vermont and New England are already noticing a variety of changes brought about by a warming climate, and a wide array of books, magazines, newspapers, television shows, websites, business journals (Lash and Wellington, 2007), communities, politicians, governments, etc., are now on the climate change bandwagon.

Several approaches blend the 'social facts explain social facts' constructionism of mainstream sociology and the ecological realism of environmental sociology: Freudenburg and Gramling's (1993) account of offshore oil drilling in Louisiana and California, Couch and Kroll-Smith's (1994) eco-logic-symbolic framework for understanding siting controversies, Weigert's (1995) article on lawns, Kroll-Smith, Gunter, and Laska's 'symbolic realism', Freudenburg, Frickel, and Gramling's (1995) article on Iron Mountain, Rosa's (1998) OREH (ontological realism, epistemological hiearchicalism) framework, and Rosa and Dietz's (1998) article on global climate change. Likewise, this dissertation sides with a OREH type approach, with Chapter 2 emphasizing the realities of peak oil and climate change, and my analysis shedding light on how Vermont's government is responding to these

problems.

Realism vs. Constructionism Summary

► In contrast to peak oil, then, the debate about the timing of climate change is over: it is happening now. Past perceptions of crying wolf are irrelevant: the wolf is at the door. Politicians, such as Governor Douglas, are avoiding being the bearer of bad news by making a social representation of governmental problem-solving through efforts such as Act 168, the Climate Neutral Working Group, and the Governor's Commission on Climate Change. Similar to peak oil, although natural climate changes are not once-in-history events, human-generated climate change is a new phenomenon. Phrases like 'carbon neutral' and 'carbon footprint' are becoming more intuitive, as are mitigation efforts such as carpooling, driving hybrids, and consuming renewable energy. It would appear that there is a greater level of concern and awareness about climate change compared to peak oil. However, even with an increased level of concern, global, national and Vermont-based greenhouse gas emissions continue to rise, suggesting that capacities to reduce emissions are not developed, and conditions (e.g., automobile dependency) that ensure emissions are widespread. Nevertheless, climate change still competes for attention with a large number of problems. The Associate Press rated the top ten stories of 2006 as follows: the war in Iraq, congressional elections, nuclear stand-offs with North Korea and Iran, illegal immigration, Congressional scandals, the conviction of Saddam Hussein, fighting in the Middle East, the resignation of Donald Rumsfeld, a thwarted terrorist plot, and the genocide in Darfur. Research questions therefore asked about the interviewee's definition of the situation (e.g. Are you concerned about peak oil and climate change? How do these problems compare with other issues your Agency is working on? Are there other issues/problems that you or your agency sees as being more pressing? Are peak oil and climate change priorities?).

The Treadmill of Production

An approach pioneered by Allan Schnaiberg (1980) stressing the inherent conflict between an exchange value conception of nature (commodification) and social and ecological use values of natural resources has been called "the single most influential framework of analysis within environmental sociology in the United States (Foster, 2005: 7). His "treadmill of production" (ToP)

thesis describes the society-environment relation within the context of globalizing capitalism. Over the past two decades, Schnaiberg and his colleagues have elaborated and refined the ToP model, characterizing the society-environment relation as an inexorable process in which economic actors (primarily corporations) use and degrade ecological resources in order to increase their accumulation of capital. Failure to do this would threaten profitability and the survival of firms (who are also driven to enhance profits by cutting labor costs and investing in capital-intensive technologies that, in turn, further increase the withdrawals of resources and energy from, and increased additions of waste and pollution to, ecosystems). Because corporate managers are constrained by the demand for expanding profits, there is enduring pressure to externalize true ecological and social costs.

When corporations are prodded to account for these costs (e.g., by governments, social movement organizations, public opinion) they tend to use their considerable influence (e.g., political lobbying and campaign contributions) to resist change (Schnaiberg and Gould 1994: 46). At the same time, workers (in order to have and maintain jobs) and governments (in order to provide for "national development" and "social security") are also dependent on the treadmill of production and, therefore, must work to facilitate its expansion (Schnaiberg and Gould 1994: 69). Since the treadmill of production is strongly anti-ecological and societies around the planet are caught up in its continued operation, Schnaiberg and colleagues foresee enduring conflict between the economy and the environment at all levels: international, national, regional, local, and interpersonal. According to Foster, this message is the most important one that environmental sociology has to convey (2005: 17).

The Treadmill of Production Summary

► Oil literally and figuratively greases the wheels of the treadmill of production. The ten largest corporations in the world[19], including six[20] of the ten most profitable corporations in the world, and consultants paid by the oil industry such as Daniel Yergin, have a vested interest in debunking peak oil and climate change. The inherent conflict of the ToP is evident. In the case of H.520, Governor

19 Exxon Mobil, Wal-Mart Stores, Royal Dutch Shell, BP, General Motors, Chevron, DaimlerChrysler, Toyota Motor, Ford Motor, ConocoPhillips. Source: http://money.cnn.com/magazines/fortune/global500/2006/index.html
20 Exxon Mobil, Royal Dutch Shell, BP, Total, Gazprom, Chevron. Source: http://money.cnn.com/magazines/fortune/global500/2006/performers/companies/highest_profits/index.html.

Douglas opposed the bill because he viewed the new "tax" on Vermont Yankee as a bad signal to other businesses in the state as well as those that might consider re-locating to Vermont. In a press release[20] outlining his opposition to the bill, Governor Douglas said "It's is truly regrettable that H.520 was poisoned by an ill-defined bureaucracy and an unnecessary tax that would undermine our economic security." Vermont Yankee provides 51 percent of Vermont's electricity supply and bad relations could potentially impact the reliability of service. Vermont's few large, nationally known businesses–IBM, General Electric and Ethan Allen–also opposed the bill. The Vermont Fuel Dealers Association, which represents the state's heating oil, propane, gasoline, and diesel fuel dealers, also opposed the original fuel tax and the new tax on Vermont Yankee.[21] Second, Vermont's state government is also expected to act on the public's behalf. Again, in the case of H.520, the Legislature aimed to simultaneously reduce home heating oil purchases and greenhouse gas emissions by weatherizing homes. In a sense, H.520 was also aimed at punishing a "bad" business that is storing radioactive waste on the banks of the Connecticut River.

This conflict, between an old way of seeing the world and a new one, and between economic development versus sustainable development may be at the heart of lack of reliability in Vermont's state government. I am hypothesizing that if preparing for, mitigating against, or adapting to peak oil and climate change is perceived to harm Vermont's economy, then Vermont's government will not develop a serious, proactive plan for addressing these problems. Research questions therefore asked the Secretary of the Agency of Commerce and Community Development, for example, how peak oil and climate change will impact business opportunities, economic development, and tourism in Vermont (Other Secretaries were asked questions relevant to their purview).

The Risk Society

According to Ulrich Beck's *Risk Society* thesis (1992a, 1992b, 1996), the development of societal organizations—the epochal transformations resulting from the transitions from hunting and gathering to agriculture to industrial modes of subsistence—has sown the seeds of the planet's ecological destruction. Each adaptation has brought about an amplification in rates of energy and

21 Url: http://www.vermont.gov/governor/press-releases/press-releases.shtml
22 Url: http://www.vermontfuel.com/server/updates/up_2007_05_11.pdf

resource extraction, disruption of ecosystem processes, increase in human population, and, ultimately, unsustainable standards of living throughout much of the world. Beck advances a three-pronged thesis–risks, reflexive modernity, individualization–to suggest that the continuing self-endangerment of industrial societies heralds the arrival of a new modernity: a Risk Society.

The risks (side effects) to the health of all species from chemicals, climate change, radioactive waste, etc., are no longer limited in time or space- there is no escape, even for the wealthy. But the primary risk from Beck's point of view is social dependency on the very people and institutions that cause the problems to begin with: techno-scientific experts and political institutions. In other words, risks originate in decisions made by elites. One of Beck's clever asides is that "Political stability in risk societies is the stability of not thinking about things" (1992b: 101). This is the case because "Protection diminishes as the danger grows" and all bets on preserving social order in the face of new destructive forces are off.

Beck's antidote is "reflexive modernization", which is similar in intent to the idea of creative destruction. The process of reflexive modernization is fundamentally a contestation and demonopolization of scientific knowledge and rationality claims. Reflexive modernization is also simultaneously a process of individualization: people are being set free from the forms of industrial society—our fixed understandings of class, stratification, family, and the gender status of women and men—only to exchange them "for the constraints of existence in the labor market and as a consumer" (Beck, 1992a: 131). The synergy of his theory is that it is precisely as individualization and institutional dependency grows that we become more susceptible to crises from global risks.

The Risk Society Summary

► The date of global peaking is debated and this lack of consensus makes it difficult, for example, to motivate governments to adopt crash programs. In the case of oil reserves, techno-scientific experts working for oil companies and government officials from oil rich nations, have historically kept reserve statistics secret (Campbell and Laherrere, 1998). On the other side, Hubbert's disciples, such as Ken Deffeyes, Matthew Simmons, and Richard Heinberg, tend to be academics or oil industry analysts without ties to the major oil corporations whose scholarly inquiry nevertheless leads

them to believe the world is near–or past–the point of peak oil production. In the same way that the "dueling scientist" agenda noted by McCright (2007) distracted attention from combating climate change, Grant argues that the debate about who is right or wrong about the exact date of peak oil gets in the way of risk management (2007: 73).

It is also possible that a history of environmentalists and others crying wolf about future disasters may have turned people off to the urgency of peak oil and climate change. Grant suggests that the "history of false signals of future disasters" should be taken in the context of population predictions by Malthus Ehrlich or the Y2K computer malfunction that never came to fruition. However, peak oil is unlike previous episodes of "energy crisis" or premature predictions of depletion. Firstly, politically sponsored shortages (e.g., OPEC embargoes) and corporately sponsored shortages (e.g., the recent California experience) were *temporary* events and can provide relatively little guidance for researching and surviving peak oil. Secondly, even with advanced sensing and drilling technology, global oil discovery peaked in the 1960s. Since oil is a nonrenewable resource, the problems associated with world oil extraction peaking will not be temporary and the whole world will be impacted. It is possible that some government employees have made a risk calculation that informs them that peak oil and climate change are not pressing issues. This could especially be the case for Agency employees who deal with non-related topics day after day, year after year. On the other hand, it is already the case that "sub-political" organizations, including local peak oil groups[22], colleges, municipalities, and businesses in Vermont are working to minimize their oil use and greenhouse gas emissions. Research questions therefore asked interviewees if they believed peak oil and climate change posed risks to Vermont.

Ecological Modernization

An alternative position to the "eco-alarmism" of the ToP and Risk Society has been advanced by Arthur Mol, Gert Spaargaren, and other advocates of "ecological modernization" (EM). Contrary to Buttel's (2000) assertion that ecological modernization (EM) replaces the concept of sustainable development (SD), I see EM as only one branch of the larger SD concept- a branch dealing with technological changes in production and consumption (e.g., radical resource productivity, waste

23 Vermont Peak Oil Network, Url: http://www.vtpeakoil.net

equals food, life cycle analysis, industrial ecology, biomimicry, resource recovery and reuse, dematerialization, resource conservation and clean production) *and* with the integration of environmental concerns into societal institutions (e.g., membership in the Natural Step, environmental education). In this view, a combination of institutional, political, cultural, technical, and economic reforms can avert widespread environmental devastation, with "significant environmental improvements in production and consumption [being] possible under different 'relations of production'" (Mol and Spaargaren 2002: 37).

For ecological modernization proponents, the "ecologization of the economy" and of society more generally makes it possible for "an ecological switchover to take place which marks the end of a period of unspecified economic growth and this will result in nothing less than an ecological reconstruction of modern society's institutional organization" (Mol and Spaargaren, 1993: 437). Element in this switchover include the development and use of cleaner, more efficient technologies, the use of anticipatory (and participatory) planning practices (the precautionary principle), the internalization of externalities, greening of the marketplace and consumption, a broad revolutionizing of popular (environmental) participation in every aspect of social life, and strict government regulations (Cohen, 1997: 109).

EM has become an attractive concept because it provides alternatives to pessimistic frameworks such as the ToP, the "growth machine", and the Risk Society (Buttel, 2000: 63-64). Mol and Spaargaren (2002: 41) suggest that the ToP and other neo-Marxist critiques offer only "meager and utopian strategies" as solutions to environmental problems. From their point of view, substantive examples of ecological modernization can be seen, for example, in the for-profit and nonprofit sectors where there are movements to apply enlightened policy and technology changes to accrue "triple bottom line"—economic prosperity, environmental quality, and social justice—benefits (Elkington 1998). There are, in fact, a variety of reasons that at least some firms might behave in this way. Some embrace environmental concerns and stewardship as a basic principle (e.g., Seventh Generation in Vermont). Some adjust along with or ahead of changing environmental and technological conditions (e.g., BP, 3M). Others profit from new paradigms and rethinking business practices (see the

cases cited in Hawken et al. 1999). Some organizations respond to changing government, professional and movement-induced standards (e.g., the U.S. Green Building Council's LEED rating system), and others respond to market pressures and opportunities (e.g., pollution trading, demand for renewable power).

ToP proponents, on the other hand, suggest that many organizations respond only after coercion by regulators. Some businesses are oblivious and/or constrained (e.g., most small businesses), while others are resistant and actively work to block change (e.g., business groups, trade associations). From the ToP view, "...there is no compelling evidence that the environment has been emancipated from the economic in decision-making criteria" (Pellow et al., 2000: 111). In addition, presumably clear-cut cases of ecological modernization such as recycling may concentrate environmental hazards to workers—an instance of the more general unequal distribution of environmental harms and benefits that are rarely the focus of EM advocacy or analysis (Pellow et al., 2000: 111). Another criticism of EM is that "dematerialization"—the "declining volume of raw materials used per unit of GNP" (Bunker 1996: 419)—actually may contribute to the expanded use of raw materials, and an acceleration of the treadmill of production (see also Sonnenfeld 2000; York and Rosa 2003; York et al., 2003).

Ecological Modernization Summary

► A history of technological advancement may have led people to believe that solutions to peak oil and climate change can or will be found. Adherents to the human exemptionalism paradigm–which has a negative connotation–and ecological modernization proponents–which generally have an optimistic connotation–fall equally into this category. It is possible that Vermont's state government sees the writing on the wall and decides to work with businesses and communities to move toward greater sustainability. In fact, in 2007 the Vermont Legislature paid arguably the world's most famous techno-optimist, Amory Lovins, to speak to the public from the well of the State House about opportunities to benefit from peak oil and climate change. On April 30, 2007, Governor Douglas issued an executive order[23] establishing an Environmental Engineering Advisory Council and the Agency of Commerce and Community Development has been made responsible to recruit,

23 Url: http://www.vermont.gov/tools/whatsnew2/index.php?topic=ExecutiveOrders&id=2414&v=Article

retain, and expand environmental engineering firms in the state. Nevertheless, many states are investing far more than Vermont is to develop their environmental technology sectors, and Vermont's fuel consumption and greenhouse gas emissions continue to rise. There is no actual plan to develop Vermont's "Green Valley", other than what is written on this website.[24] The budget for the *Vermont Environmental Consortium*, a nonprofit representing green enterprises and the likely organization for advancing the Green Valley concept had its state appropriation cut this past year and is chronically under-funded.

Research questions asked interviewees what tools their Agencies possessed to combat climate change and peak oil, anticipating responses that emphasized technological fixes. The danger in this case, as Grant (2007) points out, is that promise of biodiesel, cellulosic ethanol, hybrid cars, etc., may overshadow the fact that it will be very difficult to replace the amount of energy generated by oil.

Environmentally Significant Behavior

In addition to environmental sociology's marquee perspectives, Stern's (2000) theory of environmentally significant behavior can inform this investigation into decision-making and reliability. From Stern's social psychological perspective, the key to reducing environmentally significant behavior on a large scale is to identify and target behaviors whose impacts directly and indirectly (i.e., by shaping the context in which choices are made) change the availability of materials or energy from the environment or alter the structure and dynamics of ecosystems or the biosphere itself (2000: 408).

Stern distinguishes four types of causal variables affecting environmentally significant behavior:

- Attitudinal factors (e.g., norms, beliefs, and values),
- Contextual factors (e.g., the physical difficulty of specific actions; capabilities and constraints provided by technology and the built environment),
- Personal capabilities (knowledge, skills, resources, etc.),
- Habit or routine (2000: 417).

As examples, Stern suggests that it is often the case that environmental factors play a minor role in many of the major decisions people make (e.g., choosing to buy a home air conditioner), and that many times the environmental effects of decisions are unknown to the consumer (see especially Ryan and Durning, 1997). Many environmentally significant behaviors are also matters of personal

24 Url: http://www.thinkvermont.com/greenvalley/index.cfm

habit (especially in terms of the consumption of goods) or household routine and are rarely considered at all. Others are highly constrained by income or infrastructure (e.g., lack of public transportation in a community) (2000: 415). Stern suggests "that the more important a behavior is in terms of its environmental impact, the less it depends on attitudinal variables, including environmental concerns" (2000: 416). This implies that many of the strategies that environmental organizations utilize—demonstrations, education, and prophecy (Brulle, 2000: 244-245)—to change public perception may be ineffective at reducing environmentally significant behavior. Stern proposes that contextual factors—like the configuration of our built environment—are likely to account for environmentally significant behaviors that are difficult to change and authoritatively suggests that "Interventions do little or nothing until one of them removes an important barrier to change" (2000: 419).

Environmentally Significant Behavior Summary

► Stern's theory of environmentally significant behavior highlights the interplay between mainstream sociology and environmental sociology. The attitudinal, personal, and habitual factors he describes naturally relate to the cognitive practices previously identified: Tversky and Kahneman's work on intuition or accessible frames, the garbage can model, social representation, etc. Individuals bring these attitudinal, personal, and habitual factors into the workplace, influencing it to some degree while simultaneously being influenced by the existing organizational culture. Stern's contextual factors are largely the consequence of the treadmill of production, human exemptionalism paradigm, and other schemas (e.g., the growth machine) lashed up with resources to create our physical infrastructure and organizational structures. Contextual factors become external sources of inertia, while organizational culture become internal sources of inertia. Research questions therefore examined 1) the extent to which interviewees and Agencies/Departments were concerned about peak oil and climate change, 2) if they considered peak oil and climate change to be risks, 3) what resources were devoted to dealing with peak oil and climate change, and 4) what contextual factors inhibited action on peak oil and climate change. Questions about individual habits or routines were not asked, but I did ask 1) how peak oil and climate change compared with other issues each Agency/Department works on, 2) whether other issues/problems are seen as being more pressing, and 3) whether or not

peak oil and climate change priorities.

Concerns-Capacities-Conditions

Of the mainstream sociology and environmental sociology literatures reviewed so far, Lutzenhiser's theoretical and empirical work represents one of the few instances of research that combines the interrelationship between energy and decision-making.[25] Lutzenhiser's work has been motivated by the embarrassing fact that "The crucial role of energy in human societies has been largely ignored by all schools of sociological theory" (2001: 223). The central question linking Lutzenhiser's work has been "Why are we not more energy efficient, when clearly that has been possible?" (1992: 58). His main answer: "we have yet to really account for how energy is actually used." (1992: 50).

Through research on U.S. climate "non-policy" (2001a), barriers to energy efficiency in the U.S. housing industry (1994), household energy consumption (1992), the response of commercial and institutional organizations to the California energy crisis (Lutzenhiser et al., 2002); barriers to energy efficiency in commercial buildings (Lutzenhiser et al., 2001); occupant control of cooling systems (Lutzenhiser and Hackett, 1996); and the feasibility of advanced metering and billing systems (McBride, et al., 2000), Lutzenhiser and colleagues have largely ruled out the explanatory power of both the rational actor paradigm and engineering models. Alternatively, Lutzenhiser and colleagues have advanced a cultural model of energy use that recognizes:

1) Variation in class, ethnicity, age, gender, education, occupation, location, organizational factors, and local culture will result in variation in energy use (1992: 53). For example, survey work after the 2001 California energy "crisis" found that African Americans were more likely than Whites to report turning their lights and television off (Lutzenhiser, 2001b).

2) A frequent disjunction between actual and reported behavior. Hackett and Lutzenhiser invoke Goffman's concept of "civil inattention" to describe the possibility that reported behavior is used to manage the survey or interview; that deviations are unknown even to the deviant; and that even when people are confronted with this disconnect they are able to explain their behavior in terms of extraordinary events, unforeseen circumstances, etc. (Hackett and Lutzenhiser, 1998: 84).

25 See Shove et al., 1998 and Lutzenhiser et al., 2001 for an overview of social science contributions to understanding energy production and use.

3) Policy interventions, such as those developed by the California Energy Commission frequently do not work because they are not "ideologically salient" to the target audience (cf. Rosa and Clark, Jr., 1999). For example, the policy interventions aimed at making commercial buildings more energy efficient[26] are "of little value to the building industry because the building industry already thinks buildings are energy efficient" (Lutzenhiser et al., 2001: x). Lutzenhiser (1994) adds that risk aversion on the part of firms, lending institutions, building codes, and zoning laws has lead to a conservative building industry that relies on standardized designs and mass production techniques. Given the uncertainty of markets and the short-term goal of higher profits, many of the nation's smaller building firms do not have the capital or credit to risk innovating (e.g., green buildings). While many of the largest building firms do have the resources to innovate, they tend to "operate on a regional or national basis" which means wide variation in topography, orientation, weather, regional aesthetics and occupant use patterns (Lutzenhiser, 1994: 872). Consequently, standardized designs and mass production techniques that do not have to take these conditions into account are utilized. This conservative aspect of the building industry has considerable momentum and tends to stunt the development of innovations such as energy efficiency and New Urbanism. At the same time, the recent experience in California showed that citizens will conserve energy to avoid serious consequences (Lutzenhiser et al., 2002).

Lutzenhiser finds that people, organizations, and governments can "work to optimize efficiency or to subvert it" (Lutzenhiser and Hackett, 1996: 1). His body of research is codified in an easy to understand, exoteric framework: the concerns-capacities-conditions model. This sociological model examines concerns, capacities, and conditions to explain why policy interventions, technologies, and programs are adopted or rejected. In this model, concern–frequently precipitated by a crisis–is deemed a necessary pre-condition for action. Regardless of the level of concern, the capacity of each organization to act will inform the action it takes. Finally, even if concern and capacity are lined up,

26 A large amount of literature on barriers to energy efficiency has now accumulated. What this literature makes clear is that a range of factors enable and constrain the capacity of organizations to act: uncertainty; lack of information (including technical information); no perceived control; diffusion of responsibility; perception that things are already energy efficient, cost or budgetary concerns; lack of confidence in new technologies, rules, and regulations; and the distribution of power within an organization (Cebon, 1992; DeCanio, 1998, 1993; Goiten, 1989; Gruber and Brand, 1991; Jochem and Gruber, 1990; Komor and Katzev, 1988; Shama, 1983).

conditions facing each organization influence the actions they can take (Lutzenhiser et al., 2002).

Concerns-Capacities-Conditions Summary

► The factors identified by mainstream sociology–the environment of organizations, organizational characteristics, and cognitive practices–neatly correspond to Lutzenhiser's more exoteric concerns-capacities-conditions model (or vice versa). If Vermont's government is not acting like an HRO in addressing peak oil and climate change, it follows from Lutzenhiser's model that 1) concern about peak oil and climate change is not widely shared among government employees, 2) the capacity to prepare for, mitigate against, or adapt to peak oil and climate change is not well developed in Vermont's state government, and 3) a variety of external (e.g., lack of federal support, sprawling built environment) and internal (e.g., diffusion of responsibilities) conditions constrain the ability of Vermont's state government to act reliably. Research questions therefore ask interviewees: 1) how do peak oil and climate change get registered as concerns/problems within Vermont's state government? 2) If registered as concerns, what capacities do government personnel have for dealing with these problems? 3) What internal and external conditions enable or constrain Vermont's state government's ability to use its capacities to the fullest?

3.7. Second Synthesis: Everything but the Kitchen Sink

A review of mainstream sociology literatures found that social structures that supported and participated in HROs and HRNs were more effective at addressing a variety of disasters than social structures that did not support or participate in HROs and HRNs. I used Vaughan's cognitive practices-organizational characteristics-environment of organization model as a framing device for capturing the contributions of mainstream sociology. The mainstream sociology literature was augmented by a review of the environmental sociology literature to emphasize that human subsistence and societal development depend on supplies of energy and functioning ecosystems. The next sections synthesize these literature reviews.

► **The environment of organizations (conditions):** now refers to social environments *and* natural environments. The organizational literature found that the 'environment' of organizations frequently

forces organizations to become more similar over time. The isomorphic shape in this case is hypothesized to be a silo, with each organized tasked to deal with a specific sector of society (e.g., the Agency of Agriculture deals with agriculture). The schemas and culture of each organization vary based on the cognitive practices of workers, which are informed by intuition, mental garbage cans, and image management. Vermont's state government's ability to function is based on cheap energy and the easy flow–and taxation–of goods and services in-and-out of Vermont. Ecological realities–the depletion of a major nonrenewable resource and a change in Earth's climate–pose significant problems to governance, alongside contextual factors such as Agency silos and sunk costs. Environmental sociology adds the concept of the treadmill of production (i.e., capitalism) to describe an inherently conflicting system condition pitting public good and private gain against each other. An adversarial political system, with Democrats controlling the Legislature and a Republican Governor controlling the Agencies minimizes the government's ability to coordinate. Government organizations operate in the context of an array of constraining internal and external factors, including: sunk costs (Hannan and Freeman, 1977) such as the built environment, a global economic treadmill of production that demands increasing profits (Schnaiberg and Gould, 1994), an adversarial political system, expiring electricity contracts, resource depletion, and climate change.

I am hypothesizing that:

- *Sunk costs, existing problems, organizational structure, institutional isomorphism, global/local economic and ecological problems, an adversarial political system, and other conditions constrain state government's ability to act reliably.*

► **Organizational characteristics (capacities):** refers to the combination of resources and schemas that define the structure and capacities of an organization. Organizational resources such as roles, budget size, number of personnel, staff expertise, and other factors, vary by Agency. Organizational schemas or culture varies by the repertories of action, tool-kits, intuitions, frames, and other cognitive practices that employees bring in based on past experience, as well as organizational history. Organizational structure sets or defines the problems that get addressed. Internal sources of inertia, such as sunk costs and organizational culture may inhibit coordination. For example, it may be the case that Vermont's state government does not have adequate funding or staff expertise to follow an ecological

modernization agenda.

Each government organization is a social structure that is constituted by specific rules, human and non-human resources, and symbols (Giddens, 1984; Sewell, 1992). These rules, resources, and symbols infuse each organization with power and the capacity to accomplish tasks. Each government organization recreates and legitimates itself by using these rules, resources, and symbols. The disaster studies literature identifies capacities of effective ('big picture' communication, decentralized decision-making, extensive training, aggressive information seeking, and strong leadership) and ineffective (inadequate communication, centralized decision-making, lack of training, aggressive information seeking, and weak leadership) decision-making. The emerging, 'once-in-history' nature of peak oil and climate change means that organization capacities may be characterized by a lack of knowledge, technical skills, preparation, and general uncertainty (Grant, 2007; Lutzenhiser, 1994). Vermont's state Agency budget is overwhelmingly devoted to human services and road repair (85 percent of the total), hence state Agencies have a slim margin for devoting funds toward peak oil and climate change.

I am hypothesizing that:

- *Agencies/Departments do not have the resources or capacities they need to develop a reliable response;*
- *Existing work loads, organizational schemas, and a lack of Agency/Department concern constrain the development of HRO characteristics;*
- *State government is not coordinating to deal with peak oil and climate change.*

► **<u>The cognitive practices of individuals (concerns)</u>:** refers to the fact that individuals bring attitudes, habits, competencies, and other personal factors into the workplace, influencing it to some degree while simultaneously being influenced by the existing organizational culture. 'Cognitive practices' covers the broad scope of factors that influence whether people interpret peak oil and climate change to be problems worthy of their attention. Individual concerns are influenced by intuitions (Kahneman, 2003), attitudinal factors (Stern 2000), personal capabilities (Stern, 2000), garbage cans decision-making (Cohen et al., 1972), efforts at social representation (Laroche, 1995), adherence to the

human exemptionalism paradigm (Dunlap and Catton) experience dealing with scares or previous events (Grant, 2007; Ungar, 1995), competition between social problems (Frey and Williams), and debate about the reality of peak oil and climate change (Grant, 2007; Rosa and Dietz, 1998). The most concerned Agency personnel will be familiar with research on either problem and have some opinion about the scale of these problems. They will also be aware of some of the possibilities for ameliorating the consequences of peak oil and climate change.

I am hypothesizing that:

- *The state government has not planned for peak oil and climate change and does have a structuring mechanism or something akin to an ICS for dealing with peak oil and climate change;*
- *government employees do not perceive peak oil and climate change to be risks to Vermont, hence, aggressive information seeking and training on these problems is not a priority;*
- *the concepts and solutions are not intuitive, hence there is no domain consensus, training, etc.;*
- *some government employees believe that human ingenuity technology will solve the peak oil and climate change problems, thus down-playing the risk that they pose and the need for government action;*
- *the Governor is presenting a social representation of leadership on climate change, rather than leadership as it is described in the HRO literature;*
- *the corporate-conservation/Republican Party ideology stands in the way of developing HRO characteristics in Vermont government regarding peak oil and climate change;*

Taken together, the decision-making context of government organizations either supports or undermines characteristics of HROs, while the presence or absence of HRO characteristics leads to effective, reliable, and safe (or ineffective, unreliable, and unsafe) preparation, mitigation, and adaptation strategies.

In the context of present-day Vermont's level of subsistence organization and societal development, the key research question is to understand how the environment of state government organizations (conditions), the cognitive practices of government employees (concerns) and organizational characteristics (capacities) lay the foundation for continued societal development or lead to collapse.

4. Research Design & Methodology

My thesis is that Vermont's state government is not acting like a HRO exhibiting 'big picture' communication, decentralized decision-making, extensive training, aggressive information seeking, and strong leadership on peak oil and climate change. Chapter 2 cycled through Freese's systematic energetic model of the evolution of biosociocultural regimes to flesh out the consequences of peak oil, climate change, and a lack of government reliability in helping citizens prepare for, mitigate against, and adapt to these socio-ecological problems**.** One implication of the combined Freese/panarchy model is that even though Vermont is a small state, change can cascade up and down the system (i.e. the flea on the tail can wag the dog). Chapter 3 reviewed and synthesized contributions from mainstream sociology and environmental sociology literatures and arrived at a set of factors that impact organizational decision-making: **the environment of organizations**, the **cognitive practices of individuals**, and **organizational characteristics**. The next several sections describe how I operationalized these concepts into interview questions, how I selected my sample of interviewees, the interview process, and shortcomings of my research.

Operationalization

The potential factors identified by my literature review influence three characteristics–the environment of organizations, organizational characteristics, and the cognitive practices of individuals within organizations (Vaughan, 1999)–of any organizational decision-making context. I use these characteristics as framing vehicles for identifying and grouping the range of factors that help to explain or disprove my thesis that Vermont's state government is not acting like an HRO. That is, for each characteristic I perform a kind of litmus test that looks for the presence or absence of a characteristic identified in my literature review.

Regarding the **cognitive practices of individuals within organizations**, which assumes contexts of bounded rationality, I looked for:

► **Concerns**: In Lutzenhiser's model, concern–frequently precipitated by a crisis–is deemed a necessary pre-condition for action. The central question, then, is "Are government employees con-

cerned about peak oil and climate change?" I hypothesized that concern about peak oil and climate change is not widespread within Vermont's government. I tested this hypothesis by asking these questions to every interviewee:

- *Are you concerned about peak oil?*
- *Are you concerned about climate change?*

The presence of concern and the ability to understand and articulate the meaning of these problems is considered to be a prerequisite for leadership, communication, aggressive information-seeking and other characteristics of HROs, while a lack of concern can lead to an unreliable response.

► **Anticipation**: Diamond (2005) hypothesizes that levels of anticipation help to explain why prior societies collapsed (i.e., Easter Islanders did not anticipate that chopping down all of the trees would lead to collapse). Anticipation refers to an expectation or prediction that something will happen. The central question, then, is "Have government employees anticipated/planned for peak oil and climate change?" I am hypothesizing that the state government has not planned for peak oil and climate change and does not have a structuring mechanism or something akin to an ICS for dealing with these problems. I tested this hypothesis by asking these questions to every interviewee:

- *Where or how did you learn about climate change PROBES: At work? Outside of work? Through another organization you belong to? Through the news? Etc.*
- *Where or how did you learn about peak oil? PROBES: At work? Outside of work? Through another organization you belong to? Through the news? Etc.*
- *Did you or anyone in your organization anticipate that peak oil (climate change) would be problems for Vermont? How long has climate change (peak oil) been a topic of concern in your Agency?*
- *Has your agency done any prior planning for climate change (peak oil)?*

Anticipation, planning, aggressive information-seeking and 'practice' are characteristics of HROs. I assumed that some Agencies (ANR, AoT) anticipated that peak oil and climate change would be problems several years ago. The implication would be that these two organizations are fur-

ther along than others when it comes to planning and preparing. Alternatively, a lack of anticipation can help to explain why the state is not acting reliably.

► **Perception**: Diamond (2005) argues that levels of perception help to explain why prior societies collapsed. Perception refers to knowing or being aware of something (e.g., a crisis). The work of Ulrich Beck and research on social construction also indicates that risks are contested and they compete with other issues for attention. The central question, then, is "Do government employees perceive climate change and peak oil to be risks to Vermont?" I am hypothesizing that government employees do not perceive peak oil and climate change to be risks to Vermont. I tested this hypothesis by asking these questions to every interviewee:

- *Does peak oil pose a risk to Vermont?*
- *Does climate change pose a risk to Vermont?*

The perception of a risk or threat is a precursor to aggressive information seeking, training, and other features of HROs. If a risk is not perceived as such, then there is no need to investigate and prepare a response.

► **Intuition**: Similar to the concept of perception, Kahneman's research suggests that people make decisions based on automatic, effortless, emotional, habitual intuitions. Intuitive decisions are "skilled, unproblematic, and reasonably successful" (2003: 1467) because they are based on accessible reference points or prototypes of past experiences. The central questions, then, are "Do the concepts of peak oil and climate change seem intuitive to government employees? Are solutions to peak oil and climate change intuitive to interviewees?" I am hypothesizing that the concepts and solutions are not intuitive, hence there is no domain consensus, training, etc. I tested this hypothesis by asking these questions to every interviewee:

- *What does peak oil mean to you?*
- *What does climate change mean to you?*

If interviewees know what peak oil and climate change mean 'off the top of their heads' then a lack of intuition cannot explain an unreliable response. Alternatively, if interviewees have a hard time explaining the concepts or relating them to their work, then that might help to explain why the state is not acting reliably.

► **Human exemptionalism paradigm**: Since humans have succeeded in taking over increasing portions of the earth's total carrying capacity numerous times at the expense of other species, Catton (1982) reasons, humans have developed the mistaken belief that they could overshoot carrying capacity and live to tell about it. The central question, then, is "Do interviewees reveal a belief in the human exemptionalism paradigm?" I am hypothesizing that some government employees believe that human ingenuity will solve the peak oil and climate change problems, thus down-playing the risk that they pose and the need for government action.

No direct questions regarding the human exemptionalism paradigm were asked of interviewees. Instead, I looked for statements that reflected this paradigm in answers to other questions. For example, when asked "does peak oil/climate change pose a risk to Vermont?", I looked for answers that did not see the problems impacting Vermont.

► **Social representation/leadership**: Leaders in HROs communicate the big picture to subordinates, while also entrusting them with latitude to seek out information and to take control of situations where they have more knowledge. On the other hand, Laroche argues that "leadership" and "decision-making" can also represent an organizational process that either leads to decisions (a "self-fulfilling prophecy"), serves as an illusion for real activity, or is used to rationalize some activity after the fact (Laroche, 1995: 69-71) The central questions, then, is "Is the government exhibiting clear and effective leadership on peak oil and climate change?" I explained to interviews that by "clear" I meant were there clear channels of communication that let them know that peak oil and climate change are problems they should be working on. By "effective" I meant is the leadership effective in terms of measurements or accomplishments that showed reduced greenhouse gas emissions, for example. I am hypothesizing that the Governor is presenting a social representation of leadership on

climate change, rather than leadership as it is described in the HRO literature. I tested this hypothesis by asking this question to every interviewee:

- *Is there clear and effective leadership in Vermont on climate change/peak oil?*

► **Political ideology**: Although Vermont voters have been somewhat 'schizophrenic' in their voting patterns, Vermont's political parties have largely adhered to designations noted by Domhoff. For example, Governor Douglas is against any new taxes/surcharges such as the one that would have been applied to Vermont Yankee. Consequently he vetoed H.520. The central question, then, is "Does the ideology of the Republican Party, characterized by a strong anti-tax stance and "a general hostility to government and liberalism" (Domhoff, 1998: 4), preclude strong leadership on the part of Governor James Douglas (Republican) and his Secretaries in addressing peak oil and climate change?" I am hypothesizing that this ideology does stand in the way of developing HRO characteristics in Vermont government regarding peak oil and climate change.

I did not have direct questions about political ideology on my interview guide. Since I work for an organization that is considered liberal I felt uncomfortable bringing politics up (I did raise the issue on a couple of occasions, for example, "Is it a Republican versus Democrat thing?"). I assumed–and thankfully was right–that most interviewees would bring up politics during the course of the interview.

For **organizational characteristics** I looked for:

► **Social structure**: Social structures, as defined by Sewell and Giddens, are the bread-and-butter concept of sociology: The combinations of resources and schemas that compose social structures enable and constrain action. These rules, resources, and symbols infuse each organization with power and the capacity to accomplish tasks. The questions of interest, then, are "Which combination of resources and schemas (or toolkits) lead to characteristics of unreliable organizations? Do government employees have the resources (human and non-human) and capacities they need to properly address peak oil and climate change? Do existing missions and mandates preclude preparation, mitigation,

and adaptation activities on peak oil and climate change?" I am hypothesizing that Agencies/Departments do not have the resources or capacities they need to develop a reliable response. I am hypothesizing that existing work loads, organizational resources and schemas (including a lack of Agency/Department concern) constrain the development of HRO characteristics. Furthermore, the lack of a 'structuring mechanism' (Bigley and Roberts, 2001) for addressing peak oil and climate change makes communication and coordination very difficult. I tested these hypotheses by asking a large number of questions about resources, tools, capacities, existing mandates, coordination, as well as areas that work well and need improvement, to every interviewee:

- *What does your organization do? What is your role at X?*
- *Is the Agency/Department you work for concerned about peak oil / climate change?*
- *Are organizational resources (e.g., staff, money) being utilized to prepare for, mitigate against, or adapt to peak oil?*
- *Are organizational resources (e.g., staff, money) being utilized to prepare for, mitigate against, or adapt to climate change?*
- *Is there a procedure for bringing issues you are concerned about up with supervisors/Commissioners? How would climate change (peak oil) get registered as problems requiring your/your Agency's attention?*
- *What tools do you have at your disposal for dealing with peak oil? What are some of the things that your Agency/Department is doing?*
- *What tools do you have at your disposal for dealing with climate change)? What are some of the things that your Agency/Department is doing?*
- *Do you know if some part of your Agency's budget is allocated for planning for or mitigating against peak oil (climate change)?*
- *Are you or is your organization tasked (by either the Governor, Legislature, or Secretary) with working to prepare for, mitigate against, or adapt to peak oil?*
- *Are you or is your organization tasked (by either the Governor, Legislature, or Secretary) with working to prepare for, mitigate against, or adapt to climate change?*

- *Are you partnering/coordinating with other organizations (nonprofit, state, regional, federal) to deal with these problems?*

- *Are Vermont's Agencies/Departments and government branches coordinating to help the state prepare for, mitigate against, and adapt to peak oil and climate change? Does Vermont's government have a problem coordinating to solve tasks?*

- *There are several other initiatives going on in Vermont right now (e.g., the Climate Neutral Working Group, the Governor's Commission on Climate Change). Are you part of an intergovernmental network dealing with peak oil and/or climate change? Do you have any way of gauging how effective these different initiatives are? How well they coordinate?*

- *Is there anything about the way your Agency is organized that inhibits action on peak oil (climate change)? (E.g., what are areas that need improvement?)*

- *Is there anything about the way your Agency is organized that facilitates action on peak oil (climate change)? (E.g., what are areas that really work well?)*

For each question, an affirmative response lends credence to the argument that state government is acting reliably. A negative response suggests that organizational resources and schemas have not been put in place that will ensure a reliable response to peak oil and climate change.

For the **environment of organizations** I looked for:

► **External and internal conditions**: Government organizations operate in the context of an array of constraining internal and external factors, including: sunk costs (Hannan and Freeman, 1977) such as the built environment, a global economic treadmill of production that demands increasing profits (Schnaiberg and Gould, 1994), an adversarial political system, expiring electricity contracts, resource depletion, and climate change. The central question, then, is "What external and internal conditions impact organizational decision-making?" I am hypothesizing that sunk costs, existing problems, organizational history, the 'iron cage,' global/local economic and ecological problems and other conditions constrain state government's ability to act reliably.

- *How do these problems compare with other issues your Agency is working on? Are there other issues/problems that you or your agency sees as being more pressing? Are peak oil and climate change priorities?*

- *Do you feel pressure from any source to address peak oil / climate change?*

- *What are some of the external and internal conditions that impact organizational decision-making? PROBE: Sunk costs (e.g., our built environment), budgets, state and federal policy, world events, etc.*

- *Is Vermont's government coordinating to help the state prepare for, mitigate against, and adapt to peak oil and climate change? Does Vermont's government have a problem coordinating to solve tasks? (If yes), why does Vermont's government have a problem coordinating? Is there anything that can be done to encourage better coordination within Vermont's state government?*

Several questions referred only to Agencies and Department or to specific Agency or Department missions:

For the *Agency of Commerce and Community Development*:

- *How will peak oil (climate change) impact business opportunities in Vermont?*
- *How will peak oil (climate change) impact economic development in Vermont?*
- *How will peak oil (climate change) impact tourism to Vermont?*

For the *Department of Housing and Community Affairs*:

- *How will peak oil (climate change) impact community development in Vermont?*

For the *Agency of Agriculture*:

- *How will peak oil (climate change) impact agriculture in Vermont?*

For the *Agency of Natural Resources* (ANR is currently in the middle of a restructuring process, with a new Center for Climate Change and Waste Reduction taking shape):

- *What is the new Center for Climate Change going to do that's different from what ANR already does?*

For the *Agency of Transportation*:

- *How will peak oil (climate change) impact transportation in Vermont?*

Finally, each interviewee was asked:

- "*Is there anything I missed that you would like to comment on?"*

The Politics of Researching Politics

Qualitative researchers frequently have to manage complex and delicate relationships if they are working close to the activities that they are studying. This research (and this researcher) are not exceptions. I was in the unique and awkward position of working for a quasi-governmental organization–the Vermont Sustainable Jobs Fund (VSJF)–during the course of this research project. My position was unique in the sense that I had access to certain kinds of information about government decision-making, based on anecdotes and personal experience that led me to believe that Vermont's state government was not acting reliably to prepare for, mitigate against, and adapt to peak oil and climate change. My experience in this position helped me to select appropriate interview subjects, based on my interactions with them and my knowledge of their responsibilities. In cases where I did not know the people I wanted to interview, I was fortunate in that my co-workers usually did and were able to facilitate access (e.g., I did not know any members of the Vermont Legislature, but my boss interacts with the Legislature regularly). My position was awkward in the sense that I had to avoid politically compromising the organization I work for by asking questions that could potentially embarrass government employees, including those employees that control the VSJF budget.

Social researchers pried from the halls of academia by a hunger for "the taste and the ache of action" (Wacquant, 2003: vii) frequently describe a process of initiation and immersion that gains the confidence of their informants (e.g., Macleod, 1995; Duneier, 1999; Wacquant, 2003). Wacquant, for example, speaks in quasi-religious terms about the need to describe the "carnal dimension of existence" through "initiatory immersion and even moral and sensual conversion to the cosmos under investigation, construed as a technique of observation and analysis that, on the express condition that it be theoretically armed, makes it possible for the sociologist to appropriate in and through practice the cognitive, aesthetic, ethical, and conative schemata that those who inhabit that cosmos engage in their everyday deeds" (2003: vii-viii). My position was also unique in the sense that I did not need to initiate or immerse myself into the setting of Vermont's state government. I have already

been involved with it for four years. For me, this project was a personal experience, scientific experiment, and my current mode of *making a living*. Unlike the social researchers cited above, I can not extract myself from this situation if something goes wrong, that is, unless I want to find a new job.

To the extent that I have aspirations of continuing to make a living in Vermont, the balance I had to strike was to critically examine the workings of state government while not burning any bridges or compromising my employer. As a practical matter, this means that the types of rich descriptions of personalities and settings that are common in most ethnographies were avoided. I did not want to reveal the identity of interviewees, all of whom care deeply about their careers and Vermont. Additionally, during the course of this project I learned many things about Agencies, Departments, and personnel that led me to believe that VSJF and other nonprofits could work more closely with them in the future in order to amplify our collective missions.

Sampling

My sample was decidedly non-random. I purposively sought out three types of interviewees: 1) people within Agencies and Departments who I believed, based on my observations, were *the* employees responsible for environmental, energy, and climate change related issues; 2) the Secretaries of Agencies and the Commissioners or Deputy Commissioners of Departments who would give the official position of their respective organization (I interviewed four out of six Agency Secretaries, missing only the Agency of Administration and the Agency of Human Services); and 3) members of nonprofit organizations that interact with state government on energy, environmental, or climate related issues. I was interested in the first group of people because they are the ones, out of any other government employees, who would know what the state is doing to address peak oil and climate change. I was interested in the second group because they are all Governor appointees who would be able to explain the official position of their specific Agency, in effect, acting as proxies for the Governor. As heads of their respective Agencies and Departments, they can also offer over-arching views of all aspects of their organizations. I was interested in the third group to get a sense of opinions from outside of state government.

I had intended to interview Legislators, the Governor and the Lieutenant Governor. A few Legislators were interviewed, but I had a difficult time arranging interviews with others that I approached. My dissertation is also limited to the extent that I was unable to interview the Governor and Lieutenant Governor. Alternatively, I used public documents (press releases and news articles) that quoted them directly in order to reflect their views on peak oil and climate change.

Five people, the Governor, and Lieutenant Governor (or their staffs) did not respond to my interview request. In addition, four Agency personnel declined to be interviewed but recommended that I talk to their direct supervisor (I did so in all four instances).

Within each Agency or Department, my sample included the Secretaries of each Agency and key staff such as Deputy Commissioners:

- **Agency of Administration:**
  Department of Buildings and General Services: 2 interviews
  Department of Information and Innovation: 1 interview

- **Agency of Agriculture, Food and Markets:** 3 interviews

- **Agency of Commerce and Community Development:** 1 interviews
  Department of Housing and Community Affairs: 2 interviews

- **Agency of Commerce and Community Development:** 1 interview

- **Agency of Natural Resources:** 1 interviews
  Department of Environmental Conservation: 2 interviews
  Department of Forests, Parks and Recreation: 1 interviews

- **Agency of Transportation:** 2 interviews

Department of Public Service: 2 interviews
Department of Emergency Management: 1 interview

A total of 2 Legislators were interviewed.

Nonprofit Interviews

Prior to interviewing any other government employees, I interviewed five people from nonprofit organizations that interact with Vermont's government in order to get a sense of outside perceptions. These are people who fully understand the risk posed by peak oil and climate change. All

of them are involved in interacting with the general public, the private sector, and state government. All of the nonprofits selected have a stake in any policy response to peak oil and climate change (i.e., they are either advocating for some cause or their businesses/constituents will be impacted in some way by the problems and/or government policy). Comments from the nonprofit sector provided context that helped me understand the environment in which Vermont's government is working. There are several energy-related nonprofits that VSJF interacts with regularly: Renewable Energy Vermont, Vermont Biofuels Association, Vermont Environment Consortium, and the Biomass Energy Resource Center. I did *not* interview people from these organizations since I was concerned that the information would be too biased.

The staff size at most environmental or energy related nonprofits in the state is small. For this reason, even though I promised each interviewee confidentiality, I can not identify the environmental nonprofits by name. Even the use of pseudonyms or brief descriptors is problematic, since any keywords will immediately indicate the identity of the person I interviewed. For example, if I was to say that one of the interviewees ran a nonprofit dedicated to promoting *biofuels* in Vermont, it would immediately be clear that the person was the Executive Director of the Vermont Biofuels Association. The same condition exists for the five nonprofit employees I interviewed: Vermont is so small that one word is all it would take to identify them.

Every nonprofit interview took place at a local coffee shop or over the phone. Interviews with nonprofit staff were less structured, lasted about 30 minutes, and were focused on three main questions:

- *Are you concerned about how Vermont's state government is responding to peak oil/climate change?*
- *How do you bring your concerns about these problems to the attention of state government officials?*
- *What should Vermont's state government be doing to deal with these problems?*

When asked, "Are you concerned about how Vermont's state government is responding or not responding to peak oil / climate change?", all nonprofit interviewees answered "yes." As the following three quotes make clear, nonprofit organizations are concerned about a lack of leadership and a lack of planning on peak oil and climate change:

"I'm very concerned, yes. One of the more recent reports on peak oil was the so-called Hirsch Report in which the authors did some modeling and figured that it would take 20 years of Apollo Project level of effort for the U.S. to make a rather smooth transition to post-peak world. Most people who study peak oil from a geological perspective don't think we have 20 years left. And the U.S. government doesn't have a coordinated strategy to deal with it. The Vermont government doesn't either. We lived through Katrina a couple of years ago and we saw that the federal government is not poised to respond to an expected disaster in a relatively small part of the U.S. And when peak oil really hits us there's going to be unexpected disasters all over this country, so we need state leaders, we need local leaders to be concentrating on how to respond to this."

"Yes. Very much so. There's no long-term vision. There's no long-term planning. There hasn't been for years. The overtures that we've seen and heard, we haven't seen very much come out of them."

"To the extent that the leaders of Vermont are engaged in a discussion about climate change right now and are trying to do something about it, I am heartened. But, as we both know, the Governor, on flimsy pretext, vetoed a bill that would have done a whole lot. He made token efforts to look like he was doing some parts of what was in that bill…other things he says he's going to do by administrative feat, and he has a very poor record of doing anything related to energy and the environment by feat. The measures that are related to climate change–and we're starting to have a good conversation about–but we've got one person in the Governor's office who is blocking progress on it through inaction, inattention, distraction, and outright opposition. His name is Jim Douglas."

Each of these nonprofits has had some success at educating the Administration and Legislature, but each was also disappointed about a disconnect between their concerns and decisions that the Administration eventually makes:

"We can talk about it [meaning the nonprofit's concerns]. *We bring it up in the meetings. The question is 'what is the outcome?' The Governor did this big state wind commission and the overwhelming response in all those community meetings was 'we like wind and it should be on some state lands.' And yet the commission came out with it shouldn't be on state lands. It's all this input going in and then there's a political disconnect when the decision is actually made."*

Finally, each nonprofit had a range of ideas for preparing for, mitigating against, and adapting to peak oil and climate change, ranging from better education to planning for worst case scenarios:

"Well, I think we're moving in the right direction. And our job and our capacity and our charge is to make that move faster. And there are great people in state Agencies who want to do the right thing. It's a slow, slow beat to move state government. It almost always has been, but I don't think it has to be. And what we need to do is get people to be

like 'this is a different type of challenge, and we need to approach it differently and act with force and speed.' And that moves people out of their comfort zones. But we have to do it or we're up the creek."

"We need to have plans in place to ration gasoline. We need to have plans in place to ration food. We need to have community food storage areas. Community farms, community gardening, people who know how to garden in their backyard. Every high school in the state should have an agriculture program for its students. UVM [University of Vermont] *Extension should be beefed up by about ten times with people who can go out and create many more master gardeners than are being created now. The state government should put a lot of money into buying food from Vermont farmers to help stimulate the market here so that we have people here to feed us when we really need it. We need to have emergency plans for large scale electricity black-outs and brown-outs and for when fuel availability is at a crisis. Are the ambulances and the fire trucks going to get fuel first? If so, how are we going to assure that? What about getting doctors and nurses to work? How are schools going to be run? All these questions that we need to be thinking of."*

State Interviews

With interviews of nonprofits that interact with state government lending support to my argument that state government is not acting reliably, I moved on to state employees. I pre-tested my state government interview questions with two relatively powerful people that I felt very comfortable talking with from the Department of Public Service and the Department of Information and Innovation. My perception that I might be asking difficult questions was not substantiated with these first two interviews. Both interviewees felt that the questions were appropriate to ask other government employees. More than anything, I got a sense of question wording problems that needed to be fixed for future interviews.

I answered my questions using semi-structured interviews and tape recorded and transcribed each interview. Each person was assured of confidentiality, but because Vermont's Agencies and Departments are larger than the nonprofits, I identify each interviewee by Agency, Department, or say they are either a Senator or Representative (e.g., "Agency of Commerce and Community Development staff said…"). Arranging an interview required a telephone call or e-mail. Additionally, I asked each interviewee if there were other people within their Agency or that they knew of that I should interview. Interviews with every governmental worker lasted one hour or more and took place either in their office or at a local coffee shop.

A risk with personal interviews is the introduction of interviewer bias through, for example, the suggestion of answers, body posture, or respondent/interviewer response to the interviewer/respondent's gender, race, personality, etc. My experience with conducting over 20 interviews for my master's thesis, over 50 interviews for various research projects investigated by Loren Lutzenhiser, and over 50 interviews for grant/program evaluations in my current position have made me very comfortable with the interview process. For example, I always dress for the occasion for in-person interviews, I am tactful and polite, I do not put words in people's mouths, and I use appropriate, neutral probes when needed. My experience with interviews led me to believe they would be more illuminating than, for example, surveys or reviewing existing documents, since both the decision-making process and the problems posed by peak oil and climate change are complex and may require expansive answers.

Project Shortcomings

I had originally intended to interview more Legislators involved with H.520, the Governor and the Lieutenant Governor. A few Legislators were interviewed, but I had a difficult time arranging interviews with others that I approached. My dissertation is also limited to the extent that I was unable to interview the Governor and Lieutenant Governor. Alternatively, I used public documents (press releases and news articles) that quoted them directly in order to reflect their views on peak oil and climate change.

I did not have access to any kind of qualitative research content analysis software (e.g., NUD*IST) during the course of my research and consequently do not know how my analysis might have turned out differently. I placed answers in an Excel spreadsheet in order to compare, categorize, and analyze all responses on the same page.

Finally, although working for a nonprofit during the course of my research secured access to a wide range of interview subjects that I most likely would not have encountered in graduate school, I nevertheless experienced considerable time constraints that limited the amount of time I had to spend on this project (including the number of interviews I could conduct) and I had to be cognizant that, as an employee and not a student, I had obligations to not reflect badly on the organiza-

tion (or earn anyone's wrath). I feel like I successfully navigated this situation, but, as a result, my questions tackled the issue of the politics of reliability from angles, rather than head-on.

5. Analysis

"...what we create everyday is a dull tool."
Agency of Natural Resources employee

Chapter five analyzes the results of my interviews with Vermont government personnel. My research puts the two preeminent ecological problems of our time–peak oil and climate change–front and center in an organizational decision-making context. Even though sub-national forces such as states have taken the lead on preparing for, mitigating against, and adapting their citizens to peak oil and climate change, several questions regarding state responses are unresolved. For example, under what conditions can a state have low emissions and "high policy" (Raab, 2007a) but still not act to prepare for, mitigate against, or adapt its citizens to peak oil and climate change? How can the "greenest state in the country" not be acting reliably to help its citizens prepare for, mitigate against, and adapt to peak oil and climate change. What lessons can be learned from the experiences of low emissions/high policy states? Can state governments act more like high reliably organizations (Ginter et al., 2006; Drabek, 2005; Bigley and Roberts, 2001; Roberts and Bea, 2001; Bierly and Spender, 1995) in addressing peak oil and climate change? What barriers stand in the way of reliability?

A review of a variety of sociology and environmental sociology literatures identified many potential factors that impact organizational decision-making contexts. Using Vaughan's (1999) approach, I grouped these factors according to three characteristics–**the environment of organizations**, o**rganizational characteristics,** and **the cognitive practices of individuals within organizations** (Figure 3, page 22).

'Cognitive practices' refers to the fact that individuals bring attitudes, habits, competencies, and other personal factors into the workplace, influencing it to some degree while simultaneously being influenced by the existing organizational culture. Cognitive practices covers the broad scope of factors that influence whether people interpret peak oil and climate change as problems worthy of their attention. I assume contexts of bounded rationality, where decision-makers operate under conditions of unclear preferences, incomplete information, and unknown consequences, and are con-

sequently concerned with making satisfactory choices, rather than utility maximizing ones (Simon, 1994 [1958]). Individual concerns (Lutzenhiser et al., 2002) are influenced by intuitions (Kahneman, 2003), attitudinal factors (Stern 2000), personal capabilities (Stern, 2000), garbage can decision-making (Cohen et al., 1972), efforts at social representation (Laroche, 1995), adherence to the human exemptionalism paradigm (Dunlap and Catton) experience dealing with scares or previous events (Grant, 2007; Ungar, 1995), competition between social problems (Frey and Williams), and debate about the reality of peak oil and climate change (Grant, 2007; Rosa and Dietz, 1998).

I hypothesized that the absence of concern, anticipation, perception, and intuition, and the presence of the human exemptionalism paradigm helped to explain the absence of strong leadership, domain consensus, aggressive information seeking, 'big picture' communication and coordination, a structuring mechanism that mobilizes people to address peak oil and climate change, extensive training, and decentralized decision-making.

'Organizational characteristics' refers to the combinations of resources and schemas that compose social structures enable and constrain action. These rules, resources, and symbols infuse each organization with power and the capacity to accomplish tasks. I hypothesized that Agencies/Departments do not have the resources or capacities they need to develop a reliable response, especially due to existing mandates, programs, and cultural schemas such as a belief that government is part of the problem, not part of the solution. Furthermore, the lack of a 'structuring mechanism' (Bigley and Roberts, 2001) for addressing peak oil and climate change makes communication and coordination very difficult.

The environment of organizations refers to both social environments and natural environments that organizations operate in. I hypothesized that sunk costs (what Joseph Tainter referred to as 'declining marginal returns'), existing problems and programs, organizational history, 'iron cages,' global/local economic and ecological problems and other conditions constrain state government's ability to act reliably.

Taken together, I suggest that the decision-making context either supports or undermines characteristics of HROs, while the presence or absence of HRO characteristics leads to effective, reli-

able, and safe (or ineffective, unreliable, and unsafe) preparation, mitigation, and adaptation strategies. My thesis was largely borne out over the course of interviews with twenty-one high ranking government employees (including five Agency Secretaries, two Department Commissioners and one Deputy Commissioner), as well as five nonprofit employees. Despite being the "greenest state in the country," Vermont creates, in the words of one interviewee, "a dull tool," for dealing with problems. Except for domain consensus that climate change is a problem, the majority of the characteristics of HROs are not apparent in Vermont's response to peak oil and climate change. The next several sections review the main findings of my analysis. Each section highlights a characteristic of an HRO and how the decision-making context in Vermont's state government supports or undermines that characteristic.

5.1. Strong Leadership

► **The Cognitive Practices of Individuals Within Each Government Organization**

Literatures reviewed for this project suggested that personal and organizational concern (Lutzenhiser et al., 2002), attitudes (Stern, 2000), awareness (Diamond, 2005), anticipation (Diamond, 2005), perception (Diamond, 2005) and intuition (Kahneman, 2003) serve as precursors to action. Widespread personal and organizational concern, awareness, anticipation, perception and intuition that climate change poses a risk were evident during my interviews, as well as in official pronouncements of concern from the Governor and the Legislature. At various times, Vermont's state Legislature and Governor Douglas have shown strong leadership on climate change, through, for example, the Legislature's devotion of the first three weeks of the 2007 session to learning about it, and the Governor's involvement in the Regional Greenhouse Gas Initiative. However, the presence of concern, awareness, anticipation, perception, and intuition (i.e., domain consensus) does not explain a cleavage or disconnect between the official view of leadership (i.e., all Agency Secretaries believe the Governor and the Agencies are providing leadership) and what one interviewee termed the "peasant" view (i.e., none of the nonprofit or staff-level interviewees feel the Administration is providing leadership). This disconnect was evident even though the Governor's and Legislature's social representation of leadership on climate change is pervasive: all interviewees were aware of the fact that the

Governor and Legislature have expressed concern about climate change.

Research with a cultural slant that stresses looking at decisions and decision-making in organizations as examples of "social representation" (Laroche, 1995: 62; similar to Goffman's impression management) was found to be helpful in explaining this disconnect between the official view and the peasant view of leadership. Laroche argues that government personnel use the phrase "decision-making" to represent an organizational process that either leads to decisions (a "self-fulfilling prophecy"), serves as an illusion for real activity, or is used to rationalize some activity after the fact (1995: 69-71). Howard-Grenville's recent study also found that "organizational culture influences how an organization's members define, or 'set,' problems and the strategies they draw on to solve such problems." In particular, "the relative power of the subcultures [within an organization] influences which interpretations and strategies for action are ultimately adopted" (2006: 42). It seems likely, in this case, that variations in social representations, "problem setting," and "strategies for action" evident between official leadership positions and staff-level managers help to explain this divergent view of leadership. Elected officials such as Governor Douglas and the Legislators make social representations to their constituencies that generally emphasize problem-solving and opportunities, rather than dire potentials. Staff-level personnel and nonprofit employees are generally not in the public eye, but their daily responsibilities make them aware of what actions the state government is taking to address peak oil and climate change.

Three quotes from Agency Secretaries exemplify the Administration's perspective on leadership. Interviewees emphasized taking a balanced approach to the problems, as well as a belief that the Governor's directions to them on climate change and peak oil have been clear.

SS: Do you think there is clear and effective leadership in the State of Vermont on the topic of peak oil and climate change?

> *"Um yeah. I think they're reasonably clear from the Governor to the Secretaries to the staff around issues associated with energy use. We've implemented clean energy plans, building efficiency plans, so I think there is a line that way. And I think that there is confusion among some because of the fight we've been in with the Legislature over this issue. The Governor, unbeknownst to a lot of people, had his own set of proposals for climate change which never saw the light of day in the Legislature. But he had them. And that debate appears to continue. I think there's going to be another fight between the Gover-*

nor and Legislature this year. But, his instructions to us have been clear. We have a whole set of things that, as Agency executives, that we're launching on, that don't require legislation. I don't have many of them here, but ANR has a bunch of them and DPS has a bunch of them."

SS: One of the issues that's come up during the course of these interviews is leadership around climate change and peak oil in Vermont, and a perception of a lack of leadership. I'm curious to know if you think that Vermont's state government is showing clear and effective leadership on the topics of peak oil and climate change?

"I do. I do. I think we've spent a lot of time on those issues. The issue of energy in general and how we handle, how we plan for a changing energy future, we've spent a lot of time on that. And I think we have been leaders on that. Are we as far as some people would like? Certainly not. But I'm sure that if talked to the Tax Foundation they'd say we haven't been leaders on lowering taxes fast enough. You don't ever please everybody with everything. But, certainly, I believe that we have spent the time and provided the leadership on these issues. There's certainly a lot more work to do. It's the kind of thing where we're changing the way we've been doing things for 100 years. And certainly, so all the roads, all the bridges, this is the system that we have, we spent billions of dollars on building it and maintaining it and it takes some time to turn that around. It's not just, we can't do it unilaterally, we also have to make sure we're adapting to how the marketplace is adapting. By the marketplace I mean people: what are they driving? What do they want to drive? Part of being a leader on that is being in step with what the people want, what they're asking for, and what they need. We could be way out and front and not be providing the services that we need today. If we went and said "We're going to be leaders in public transit and put half of our budget in public transit." Bridges will still wash out and culverts will fail because we haven't put the money in maintenance. So, there is a balance there. Part of providing that leadership is striking a balance, which I think we've done."

SS:...So did this holistic vision come from you or the Governor? Did you bring this to the Governor, or how did it come about?

"*When you get to the Secretary level, the Secretary's have the big picture in place. Very often when you get into the bureaucracies there are differences and I think it has a lot to do with leadership at the top setting the table for a holistic vision... The Governor has a very holistic vision and I think what he's done is put Secretaries around him that have a holistic vision."*

The next set of quotes are from staff-level employees or nonprofit organizations. The quotes reflect a number of critiques of the Administration's leadership, ranging from lack of vision, lack of unity, lack of management, and an unwillingness to alter philosophies.

SS: Is there clear and effective leadership in Vermont on climate change?

"*No. I don't think so. I mean, we do have the executive order in 2003 that Douglas signed and we have the state energy plan, which relate to climate change, but I would characterize it as not a strong emphasis on climate change.*"
-Buildings and General Services (BGS)

"I think that Jim Douglas is a canny politician who knows that he needs to pay at least lip service to doing something about climate change in order to be elected in Vermont. But, yeah, I think he's doing as little as possible. He won't even appear to sign the pledge [Step it Up] *that every other statewide candidate signed last year to support 80% reduction in CO_2 emissions in Vermont by 2050. So, I think he's doing as little as possible to be politically viable in the state."*
-Nonprofit

"*Absolutely not. Regardless of mandates or intentions expressed in one way or another in the State of Vermont at this point in time there is no leadership on anything. I'll make a blanket statement. I've worked with a variety of different Departments in state government, as well as the Governor's office and the absence of leadership is our biggest challenge."*
-Agency of Natural Resource (ANR)

"The politics got in the way of good policy. Some of the programs in 520 were no-brainers. To see the politics get in the way, it shows a lack of leadership, it shows lack of vision, it certainly shows lack of longer term thinking. Now, this is scary that we're not moving ahead on a lot of these things. I would agree with the premise that the State is not getting its act together to really show leadership on this."
-Nonprofit

In an extended conversation with a nonprofit organization employee, all of these critiques are voiced:

SS: Where would a comprehensive vision [for addressing peak oil and climate change] come from?

"It doesn't exist right now."

SS: There's no mechanism that could unite all of these Agencies?

"No, there absolutely is. The mechanism is the Governor. He is the person who is supposed to be managing his Agencies. And whether that's actually him or whatever Deputy is in charge, but to the extent that the Executive branch runs the Agencies and directs the Agencies and appoints the Agency Secretaries, the burden falls on his shoulders for how well we are doing or not doing. And right now we are going in the wrong direction."

SS: What should the Governor be doing that is somehow different than the Climate Commission? Would it be a matter of appointing different Agency heads?

> *"Well, one, it would be changing his philosophical position in terms of what policy he is willing to consider. If he is serious about this issue, then he should be seriously looking at all possible solutions to it. Not out of hand dismissing some of them that might be the most effective."*

SS: Are you talking about the head of the Commission saying he prefers carrots, not sticks?

> *"Yeah, prefers carrots not sticks. Only interested in doing consensus stuff. You know, dealing with the biggest issue facing civilization is not going to be a cakewalk. There's going to be some contentious issues. You've got to work through controversy. If you're only doing the easy stuff, then you know you're not doing a lot of the meaningful stuff."*

SS: In terms of conditions impacting government decision making, it sounds like a lot of what you're saying goes back to the philosophy of the Governor.

> *"Yeah. And I don't know what the inner workings are of the administration, how much those Agency heads get together and what they talk about when they do. But, if they were on the same page in terms of 'We're going to do something about this', even within their philosophical constraints in terms of what the Governor may or may not do, then they might actually start working more together and talking more together. And that's just not happening. I mean, Buildings and General Services is doing a job, I'm not going to pass judgment on whether it's a good or bad job yet, and that's just teeny. It's like, trying to get their act together to address state government's emissions, which is a drop in the bucket. And how long has Douglas been in office? Four years. When was that set up? 2003, when he first took office. Then there's the question of what grade did they get last year? Internally, Buildings and General Services graded their own performance on reaching the goals in the state Agency plan- an F! Because they're going in the wrong direction. They gave themselves an F. In some ways I'll give them credit for that. They're not futzing around."*
> **-Nonprofit**

The divergence between the official representation of leadership and a staff-level view is compounded by the ideological differences between Republicans and Democrats, particularly on taxation and the role of government. Vermont's political parties have largely adhered to designations noted by Domhoff (1998). For example, Governor Douglas's Affordability Agenda is premised on a strong anti-tax stance. This is the case even though "A new legislative review of the Vermont tax system has found that it is among the most progressive in the country, meaning poor and middle-class Vermonters do not pay as large a share of their incomes as their wealthier neighbors" (Porter,

2007b). In this instance, then, the intuitive responses, accessible frames, or ideologies that some government employees possess may preclude certain courses of action on peak oil and climate change (i.e., the Governor is against any new taxes/surcharges, including the one that would have been applied to Vermont Yankee to fund an all fuels efficiency utility. Consequently, he vetoed H.520 and pushed for voluntary programs).

Interviewees were very aware of the influence that political ideology has on leadership and other characteristics of high reliability organizations. One side generally believes that the Administration is incompetent, is frustrated at their policy preferences, and has the sense that Republicans disdain government. Although the Democrats appear to have very little respect for the Governor and his Cabinet, they are nevertheless dumbfounded that he keeps defeating them without using their ideas, as the following quote reveals:

> *"It's kind of amazing to me, because I think of Jim Douglas, if nothing else, as being a somewhat clever politician, and what my perception is that he is a master of sound bites but not a master of anything structural. I think Douglas is cautious and fundamentally timid and so when he talks about is stuff that is very packaged, very compressed down to almost nothing. So, he doesn't even grasp that these bastards* [the Democrats] *are on to something. And a smart politician would say "I'm going to take it from them." So what I expected of Douglas is that he would see this and say "Jesus Christ! This is my chance. I can take all of this." He's tried to take the language but he doesn't grasp the concepts in any ways that would allow him to steal the ideas. And politics, sometimes your best success is having your best ideas stolen. And I think a combination of Douglas, and I think the Commissioner of the Department of Public Service is totally inept, I don't think he gets it, a combination of them and the timidity on the part of the other leaders in the state, it just isn't happening. I'm astonished that it's not happening, to be honest, even in a crass, politically opportunistic seizing kind of way."*
>
> **-Nonprofit**

A quote from a staff person at Agency of Natural Resources explains that the Republican view that government is "the problem" compounds the existing divide between upper level management and staff, stands in the way of strong leadership, and results in a "dull tool" for solving problems:

> *"What I find coming out of the Republican Party is this consistent theme that government is the problem. Whether there's any truth to that or not, that consistent theme means that folks who interact with government start out with that presumption. People who work for the government hear that and take on that role, whether they like it or not. It's a cultural*

shift of saying that the government is a part of the solution. I think, comparatively, government is where we collect our common wealth...None of us can afford to pay for what we get, it's only through this common wealth that we can be powerful as a group. Government is part of that common wealth. It is the collector of it, it is the disperser of it, it is the major partner with the private sector for allowing us to solve problems. A Governor who can step forward with great vigor and start laying out a different culture would be a very interesting scenario. But, there's too much fear. People are afraid about 'what's going to happen to me? I'll compromise on this so that I can stay here and do what I think is important.' In the process, everything gets shaved of its corners and sharp edges and you can't get too much done with a dull tool. That's what we create everyday is a dull tool."
-ANR

On the other side of the equation, the Governor's Administration feels that the Legislature is ignoring the Governor's views and policy/program preferences:

"It would have been hard to ignore the fact that the Legislature is spending that amount of time on the issue [i.e., climate change]. *Or the political ramifications of what ultimately happened there. The fact that other public policy initiatives, housing, was ignored by the Legislature. Absolutely and utterly ignored. It's a huge issue. But the leadership decided to spend time on other issues. That's their decision. The public will decide whether that was the right decision. For us, I can only believe that it squeezed us out. There was no appetite for that or other policy issues that we had. So, for us, it was a negative thing. Hopefully this year it will go back to housing."*
-Agency of Commerce and Community Development (ACCD)

"I think the politics of the deal are pretty significant, unfortunately. You need to understand that my political antennae are pretty sensitive. I think the politics of what's going on are very significant. In fact, the Governor has some pretty good ideas about how we could use energy more efficiently that were totally ignored by the Legislature. There are far too many political issues right now in the state, and that's one of them. So, the obstacle there I believe are the politics. And the policies, the Governor has a fundamental different point of view on things like taxing."
-ACCD

Although the Governor's Cabinet feels ignored by the Legislature, they have used their main political difference–taxes–to garner enough support to re-elect the Governor for three consecutive terms, as the following quote reveal:

"Basically, Scudder Parker [the Democratic candidate for Governor in 2006] *lost because of the Governor's affordability initiative. He made Scudder look like a proponent of taxation. That's a big issue for the voters. Anything that would increase taxes is an obstacle."*
-BGS

Two other schools of thought from the environmental sociology literature shed light on leadership in Vermont: the treadmill of production and ecological modernization. According to Schnaiberg's treadmill of production, when corporations are prodded to account for these costs (e.g., by governments, social movement organizations, public opinion) they tend to use their considerable influence (e.g., political lobbying and campaign contributions) to resist change (Schnaiberg and Gould 1994: 46). At the same time, workers (in order to have and maintain jobs) and governments (in order to provide for "national development" and "social security") are also dependent on the treadmill of production and, therefore, must work to facilitate its expansion (Schnaiberg and Gould 1994: 69). Ecological modernization has become an attractive concept because it provides alternatives–technological changes in production and consumption and the integration of environmental concerns into societal institutions–to pessimistic frameworks such as the treadmill of production, the "growth machine", and the Risk Society (Buttel, 2000: 63-64).

From a treadmill of production perspective, Vermont's government can be expected to *not* provide leadership in addressing climate change and peak oil due to business influence, while an ecological modernization perspective would expect, over time, and with sufficient popular support for such engagements, that Vermont's state government would have increasing interest and incentive to work with businesses and communities to move toward greater sustainability. In the case of H.520, the Legislature's most sweeping effort to introduce ecological modernization legislation,[27] the treadmill of production effectively stopped the State of Vermont's ability to provide institutional and political leadership in addressing climate change and peak oil. The bill received endorsement from environmental groups such as Vermont Public Interest Group and the Vermont Natural Resources Council, business support from Vermont Businesses for Social Responsibility (the largest organization of its kind in the United States), and support from Vermont's Congressional delegation. Governor Douglas opposed the bill because he viewed the new "tax" on Vermont Yankee as a bad signal to other businesses in the state as well as those that might consider re-locating to Vermont. In a press release[28] outlining his opposition to the bill, Governor Douglas said "It's is truly regrettable that H.520 was poisoned by

27 Url: http://www.revermont.org/pdf/H520_overview.pdf
28 Url: http://www.vermont.gov/governor/press-releases/press-releases.shtml

an ill-defined bureaucracy and an unnecessary tax that would undermine our *economic security*" (emphasis added). Vermont Yankee provides 51 percent of Vermont's electricity supply and bad relations could potentially impact the reliability of service. Vermont's few large, nationally known businesses–IBM, General Electric and Ethan Allen–also opposed the bill. The Vermont Fuel Dealers Association, which represents the state's heating oil, propane, gasoline, and diesel fuel dealers, also opposed the original fuel surcharge and the revised charge on Vermont Yankee.[29]

As the "greenest state in the country," Vermont might be expected to have advanced a strong ecological modernization agenda. This has historically not been the case, although on April 30, 2007, Governor Douglas issued an executive order[30] establishing an Environmental Engineering Advisory Council and the Agency of Commerce and Community Development (ACCD) has been made responsible to recruit, retain, and expand environmental engineering firms in the state. Nevertheless, many states are investing far more proportionally than Vermont to develop their environmental technology sectors, and Vermont's per capita and total fuel consumption and greenhouse gas emissions continue to rise. There is no actual plan to develop Vermont's "Green Valley", other than what is written on the website footnoted here.[31] The budget for the Vermont Environmental Consortium, a nonprofit representing green enterprises and the likely organization for advancing the Green Valley concept receives a small appropriation from the state each year but has a very small budget and one staff person. Likewise, ACCD has not had the funds to promote the Green Valley concept, as the following quote indicates:

> "*So, funding for us, being able to promote the Green Valley in this particular case, it's not because the Governor doesn't want to put money into this, we've got Medicaid challenges, we've got teacher retirement challenges, we've got some other Human Services related challenges like we need to build a new hospital, we need to get people out of buildings that are sick and so on. And those things take precedence. We do the best we can with the money we get. Frankly, that's why we magnify by working with private partners.*"

In sharp contrast to climate change, the social representation of leadership on peak oil is virtually non-existent, with many interviewees feeling that addressing climate change takes care of

29 Url: http://www.vermontfuel.com/server/updates/up_2007_05_11.pdf
30 Url: http://www.vermont.gov/tools/whatsnew2/index.php?topic=ExecutiveOrders&id=2414&v=Article
31 Url: http://www.thinkvermont.com/greenvalley/index.cfm

peak oil. A few interviewees were unclear on the peaking date and consequently felt that it is not a short-term problem, and there were no organizational 'champions' pushing for action on peak oil. As section 5.2. will indicate, the lack of domain consensus that peak oil is a problem is the main barrier to strong leadership to address it.

► **Organizational Characteristics**

Organizational characteristics of the Legislature, the Governor's cabinet, and Agencies/Departments enabled and constrained the ability of each to provide leadership on climate change and peak oil. In the case of the Legislature, although the Speaker and Senate Pro Tem act as leaders, the fact is that the Legislature is a 180-member body, made up of several parties, with each Senator or Representative accountable to their constituency. Complete cohesion is impossible under these conditions, as the following quote indicates:

> *"We're obviously taking the leadership role* [on climate change]*, but when you have a body that's 180 strong, you know, you can have the President Pro Tem and the Speaker of the House, and yes they are the leaders, but the leaders of what? Nobody up there elected me. I answer to my constituency."*
> **-Legislator**

The Governor has the bully pulpit, and his cabinet operates similarly to Medvetz's (2006) description of Wednesday meetings of the corporate-conservative coalition: the Governor's appointees are friends who are united by the Governor's vision for Vermont. Within the Governor's Cabinet, Agency Secretaries expressed a sense of camaraderie, friendship, as well as a belief in the Governor's vision that reinforces the view that the Governor's Administration is providing leadership on climate change. For example, one Agency Secretary explained that:

> "*This administration, we all get along great. The Secretaries and Commissioners, every one of them, I'd be happy to have anyone of them, and have, for dinner over at my house. We're all friends. And we are at the Commissioner's level and the Deputy's level. So, I don't see any impediment for coordination between the Governor and his Agency and Department executives, or between us, at all. Clearly there are differences between the Administration and the Legislature."*

Agency and Department employees identified a lack of resources (e.g., skills, money), current mandates or commitments to long-standing problems, or the fact that they are not specifically tasked

with addressing peak oil and climate change as major factors constraining their ability to provide leadership. Additionally, staffers are rarely in *public* leadership positions. A staff-level employee at ANR used a colorful analogy to describe the fact that different 'definitions of the situation' guide the perceptions and activities of the upper levels of government and staff. This analogy reinforces the idea that staff-level employees are expected to provide leadership.

> *"Well, functionally there are two realms of existence. It doesn't matter what frame you want to put around it—peak oil, childhood nutrition, health care—there are two spheres of existence. There is one of the appointee population, that is, the top level, the executive branch. They live in a bubble. Their bubble is about re-electing the Governor, keeping their job, managing appearances, individual ego, ambition, that sort of thing. What others refer to as the 35,000 foot level. Staff are the peasants on the outside of the castle walls. They give the appearance to the executive elite that they are conforming to what they want, when in fact they're going about their daily work and the executive elite are almost always clueless, no matter how much the person is into micro-management. There is a distinct, thick wall between the two where the peasants outside the castle wall will fight to conserve what they believe is the good, the right, and proper. They give the appearance of conforming to whatever is coming from inside the castle wall. Sort of fundamental to that culture is the belief that the peasants can't be right."*
> **-ANR**

At an organizational level, and in contrast to climate change, where domain consensus that it is a problem has emerged and where the Climate Neutral Working Group and the Governor's Commission on Climate Change have formed, no state Agency or Department is tasked with addressing peak oil. No state Agency or Department is providing leadership in preparing for, mitigating against, or helping Vermonters adapt to peak oil. As subsequent sections will make clear, a lack of domain consensus, structuring mechanism, or a mandate encouraging aggressive information seeking has ensured that peak oil is viewed as a subset of the climate change problem at best, and ignored at worst.

► The Environment of Organizations

As described in the next section on domain consensus, a wide range of external and internal factors influences, including personal experiences, education, increased public awareness and media coverage, the movie *An Inconvenient Truth*, seem to have influenced the concern expressed by the Governor and Legislature. The concern expressed by the Governor and Legislature, in turn, seem to have elevated personal and Agency/Department/Administration concern. These influences led Senate

Pro Tem Peter Shumlin and other leaders of the Legislature, for example, to devote the first three weeks of the 2007 session to discussing climate change, with invited speakers such as Amory Lovins and Bill McKibben giving talks in the State House. Likewise, Governor Douglas, for example, signed Vermont on to the 25 by '25 initiative, which aims for a national goal of 25 percent of America's energy produced from renewable sources by 2025. At the same time, the Vermont Fuel Dealers Association, IBM, and other businesses discouraged Governor Douglas from supporting H.520, a bill that Al Gore suggested would place Vermont at the forefront of the growing global movement to address climate change.

Although almost all of the interviewees were old enough to have experienced "social scares" (Grant, 2007; Ungar, 1995) such as OPEC oil embargoes in the 1970s, and all of them are aware of the possibility of resource shortages and rising gas prices, the idea of peak oil has not yet become part of the social representation of governmental leadership. A few interviewees suggested that the Governor's embarrassment on a local radio show when he admitted not knowing what peak oil meant, and subsequent chiding in the press, led him to disavow the topic.

As section 5.7 on decentralized decision-making points out, staff-level concern, anticipation, perception, and intuition about climate change did not appear to influence leadership, lead to organizational concern or to consistent, reliable Agency/Department planning, even though all interviewees suggested that it was possible in each Agency or Department to share their concerns with supervisors.

In summary, the presence of domain consensus (e.g., concern, awareness, anticipation, perception, and intuition) that climate change poses a risk to Vermont helps to explain instances of governmental leadership. However, the Governor's social representation of leadership on climate change is not believed by nonprofit or staff-level interviewees. The cleavage or disconnect between the official representation of leadership (i.e., all Agency Secretaries believe the Governor and the Agencies are providing leadership) and the "peasant" view of leadership (i.e., none of the nonprofit or staff-level interviewees feel the Administration is providing leadership) is accentuated by political ideology.

Most staff level interviewees, the two legislators interviewed and all nonprofit employees believe that the Administration is incompetent, are frustrated at the Governor's policy preferences, have the sense that Republicans disdain government, and appear to have very little respect for the Governor and his Cabinet. The Governor's Administration, on the other hand, feels that the Legislature is ignoring the Governor's views and policy/program preferences. Despite being the "greenest state in the country," Vermont's state government has not advanced an ecological modernization agenda. The state government's most far-reaching attempt to pass ecological modernization legislation (H.520) was stopped by treadmill of production/power elite forces that encouraged the Governor to veto the bill.

Organizational characteristics of the Legislature, the Governor's cabinet, and Agencies/Departments enabled and constrained the ability of each to provide leadership on climate change: the Legislature is providing leadership on climate change but does not have the bully pulpit; the Governor has the bully pulpit, but the "bubble" of the executive branch is viewed as divisive and clueless; staff-level employees are not viewed as leaders and lack resources, are already occupied with current mandates or commitments to long-standing problems, or are not specifically tasked with addressing climate change. A wide range of external and internal factors have encouraged the Governor and Legislature to show leadership on climate change, but some of these factors have also discouraged leadership, as was the case with Vermont's most far-reaching attempt at advancing an ecological modernization agenda (i.e., H.520).

In sharp contrast to climate change, the social representation of leadership on peak oil is virtually non-existent, with many interviewees feeling that addressing climate change takes care of peak oil. A few interviewees were unclear on the peaking date and consequently felt that it is not a short-term problem, and there were no organizational 'champions' pushing for action on peak oil. No state Agency or Department is providing leadership in preparing for, mitigating against, or helping Vermonters adapt to peak oil. Finally, external events have elevated concern about peak oil, but that concern has not translated into instances of governmental leadership. In fact, one incident (the Governor's appearance on a radio show where he admitted not knowing what peak oil meant), is conspiratorially portrayed by some interviewees as a reason for why the Governor has not provided

leadership on the problem.

5.2. Domain Consensus

► **The Cognitive Practices of Individuals Within Each Government Organization**

As stated in section 5.1., literatures reviewed for this project suggested that personal and organizational concern (Lutzenhiser et al., 2002), attitudes (Stern, 2000), awareness (Diamond, 2005), anticipation (Diamond, 2005), perception (Diamond, 2005) and intuition (Kahneman, 2003) serve as precursors to action. Conversely, the organizational theory literature also suggests that peak oil and climate change may not be ideologically salient to government workers. That is, it may be the case that solutions to climate change and peak oil are not intuitive to some government employees, or the garbage can (Cohen et al., 1972) they usually draw from to solve problems does not provide guidance when it comes to solutions to peak oil and climate change. In addition, the social constructionism perspective emphasizes both the uncertainties that "underpin scientific claims about climate change" and the social context that elevates climate change to prominence (Rosa and Dietz, 1998: 440). For example, McCright (2007) has studied how climate change contrarians mislead politicians and the general public about climate change by providing the pretext of accountability (i.e., the "dueling scientists scenario") even though they generally operate outside of the scientific community (cf. Union of Concerned Scientists, 2007). In contrast to the dueling scientist scenario or the idea that climate change and peak oil are not ideologically salient, interviews for this project revealed that widespread personal and organizational concern has led to one characteristic of HROs: domain consensus that climate change is a problem. There was also domain consensus in the sense that all nonprofit interviewees were concerned about the way Vermont's government is responding to peak oil and climate change.

Every interviewee was familiar with the concept of climate change and considered it a risk. Every interviewee except one Agency staffer and one Department Commissioner felt that climate change was caused by humans (the dissenters believed it could be part of a natural climatic cycle). The following quote from a Department of Public Service employee is typical of the kinds of responses

indicating concern about climate change:

> *"I feel strongly about the impact of human activity on the climate. You know, whether it's going to have an impact in 50 years or 200 years I think it's incumbent on us to make changes in the way we do things in order to positively impact what I think is a negative path we're on."*

Only two out of the 26 interviewees (including one Agency Secretary) were *momentarily* stumped when I asked them what peak oil meant. When I described what it meant they appeared to grasp the concept and expressed both their concern and belief that it posed a risk to Vermont. Nevertheless, personal concern about peak oil was mixed and caveated. For example, most interviewees considered climate change to be the bigger problem, a few were unclear on the peaking date and consequently felt that it is not a short-term problem, and there were no organizational 'champions' pushing for action on peak oil. Finally, a few interviewees suggested that the ridicule that Governor Douglas received after admitting not knowing what peak oil meant led to a disavowal of the topic:

> *"I have heard that the Governors performance on a Switchboard show* [a public radio show]*, followed up by the ridicule that Peter Freyne* [a local columnist] *directed at him in a column left Jim Douglas and his people gun shy about the term peak oil. I haven't heard the show, but apparently Douglas didn't know what peak oil was. That's fine, I didn't know what peak oil was four years ago. Peter Freyne ridiculed him. A mature politician would have said "this is interesting, I'm thankful to you for bringing this up." He would ignore the ridicule and investigate and figure out how he can use the resources of this state to help the people of Vermont prepare for peak oil. Apparently Douglas did something else."*
> **-Nonprofit**

> *"I realized that in state government there are limitations to the extent to which I can talk about peak oil...peak oil is something that, unfortunately, our Governor was embarrassed by in a public situation. As a result of that he seems to be pushing back to some degree."*
> **-ANR**

The interviewees concerned specifically about peak oil had read James Kunstler's *The Long Emergency* or had seen a documentary such as *The End of Suburbia*. Other interviewees specified that the phrase 'peak oil' was not used, although energy conservation and getting off fossil fuels were commonly discussed in government circles. Interviewees frequently conflated peak oil and climate change as the same problem, with an emphasis or priority on the 'climate change' part of the equation. The following three quotes exemplify these findings:

"It's not framed as peak oil. It's framed as- we've got to get off of fossil fuel. We've got to conserve energy. That's how it's framed. Peak oil is not in the lexicon."
-Agency of Transportation (AoT)

"Here's my feeling on peak oil: I don't care. Because I think climate change is such an important issue, I think peak oil is a red herring. Whether we have oil here for 50 years or 100 years is irrelevant to me because I think we need to get off fossil fuels. I almost have a visceral reaction when people bring up peak oil because I just think I hope we run out of oil because it's having such a negative impact on the climate.
-DPS

"Yeah, I have a hard time separating peak oil and energy efficiency and climate change because, you know, CO_2 is the problem. I don't think about 'there's the peak oil silo, there's the energy efficiency silo.' We have a bunch of mandates around energy efficiency. There's mandates to write energy plans in our operations. The Public Service Department is writing a brand new comprehensive energy plan that's going to look at petroleum. There's a lot of work being done in state government on energy planning around efficiency. And then the other silo is climate change. It's all one thing and that is use less energy."
-AoT

As section 5.7 on decentralized decision-making indicates, staff-level concern, anticipation, perception, and intuition about climate change did not appear to influence leadership, lead to organizational concern or to consistent, reliable Agency/Department planning, even though all interviewees suggested that it was possible in each Agency or Department to share their concerns with supervisors. Rather, personal experience, education, involvement with the New England Governors and Eastern Canadian Premiers conference (which addressed climate change in 2000), increased public awareness and media coverage, the movie *An Inconvenient Truth*, seem to have influenced the concern expressed by the Governor and Legislature. The following quote captures several of these concerns, with particular emphasis on how a local celebrity, Bill McKibben, and the 2007 Legislative agenda elevated publicity on the topic:

"*Al Gore's movie had something to do with it, clearly. When the President Pro Tem* [Peter Shumlin] *says this is going to be the issue, from that came an enormous amount of activity. There were some activists here in Vermont, like Bill McKibben, who were able to get local and national focus on themselves and the issue that drove that as well. I tell you what, when a politician puts something out on the table and the press pays attention, it's like the Pavlov's dog thing. You keep putting bait out there and when the press licks on it. They had a hell of a lot of publicity. I'll take the President Pro Tem at his word that he's*

deeply concerned about this. But the fact that the press then paid attention. Now, if he had said the defining issue of the time for middle income Vermonters, the press wouldn't have went along with it. I think that had a lot to do with."
-ACCD

► **Organizational Characteristics**

Administrative and Legislative consensus that climate change is a problem led to the Climate Neutral Working Group (CNWG), the Governor's Commissioner on Climate Change, and H.520. As Chapter 1 indicated and section 5.5 will indicate in more detail, the creation of these groups and legislation has been marked by characteristics of unreliable organizations. For now, it is sufficient to say that consensus that climate change pose risks to Vermont has not been matched with resources, capacities, expertise, etc., to match the scale of the risks. At an organizational level, and in contrast to the problem of climate change which as least has the CNWG, no state Agency or Department is tasked with addressing peak oil. The Agency of Transportation and DPS are now including on implication of peak oil–high gas costs–in their energy modeling, but it is not clear that the full implications (e.g., mitigation and adaptation) are being considered.

► **The Environment of Organizations**

Lutzenhiser's concerns-capacities-conditions model**,** Stern's contextual factors, and Hannan and Freeman's emphasis on external sources of inertia all suggest that concerns, capacities, and the ability to adapt may not be enough if conditions or contextual factors are unfavorable. With regards to climate change, domain consensus that it is a problem is apparent in Vermont's government and organizational forms for confronting it are nascent. Domain consensus that peak oil is a problem has not been established and organizational forms for confronting it have not been conceived. In any event, if domain consensus that climate change and peak oil are problems and organizational forms for addressing both were in place, it is still the case that government interviewees are overwhelmed by existing problems, conditions, and priorities, as the next four quotes spell out:

SS: So you're already operating at some type of deficit?

"Yeah, we are already in a deficit. We have been in a deficit, really, for probably 30 years. That's kind of the environment we've always found ourselves in. We always oper-

ate in a deficit. In the early 1990s, late 1980s, the Governor at that point was very aggressive about capital investments, and that worked out well. But since [then] we've gone to a different structure which means we cannot spend as much on capital investment as we used to, we have a debt affordability structure, our capital investment has been really crippled."
-BGS

"In the last 20-25 years we have not put enough money into taking care of our existing infrastructure, and that's been a mistake because the cost of replacement is much more than the cost of repair. So part of what we're doing, and what we've been doing for the past two years is realigning our budget around taking care of what we've got versus building new stuff."
-AoT

"On a daily basis, housing is a huge issue for us. Retention of businesses, what [the Commissioner of the Department of Economic Development] *calls the blocking and tackling, the day-to-day contact with businesses and helping them through problems. I read about one in the paper today that we got very unfairly criticized about which is the Dirigo Paper situation up in Gilman. We've been working hard to make that one work and it's not going to work in its current form. We have a very significant focus on helping existing businesses here continue to be here. The tourism side of things there's an intense marketing focus. We have our legislative agenda that we're putting together, we're just starting the budget process. All these things occupy a chunk of my time as a manager. And then there's just general personnel management issues. All those things are everyday."*
-ACCD

"What comes to mind is that there are so many issues that seem like a priority, especially for policy makers working in the State of Vermont. There's transportation infrastructure that's deteriorating, there's a housing shortage, there's demographic trends, there's a preponderance of issues that are really serious and really need people's heads to get around them. I see this as one more issue that's bouncing up but having trouble breaking through because of all the other really important issues. I don't personally think it's any more or less important than anything else, but I know that I can look back in folders on these same housing issues that we're talking about today, we were talking about 15 years ago, that we're still trying to get our arms around. There's kind of an institutional knowledge of problems or issues that the state has, I think there's a sense that we have to deal with these things that have been sitting on our plates for so long. I think the perception of peak oil and climate change is still kind of new, how's it going to compete with longstanding, really serious issues?"
-ACCD

In summary, personal and organizational concern has led to one characteristic of HROs: domain consensus that climate change is a problem. Every interviewee was familiar with the concept of

climate change and considered it a risk. However, personal, staff-level concern, awareness, or perception about climate change or resource depletion has not historically led to organizational action, even though interviewees believed that they had a means of sharing their concerns with supervisors. Rather, it appears to be the case that major policy shifts on energy and climate coincided with external events (e.g., the oil embargo and New England Governors and Eastern Canadian Premiers conference), suggesting that decentralized decision-making is not a characteristic of Vermont's government. Personal concern about peak oil was mixed, caveated, and does not appear to have lead to domain consensus that it is a problem requiring attention. For example, most interviewees considered climate change to be the bigger problem, a few were unclear on the peaking date and consequently felt that it is not a short-term problem requiring attention, while others frequently conflated peak oil and climate change as the same problem.

Administrative and Legislative consensus that climate change is a problem has led to the Climate Neutral Working Group, the Governor's Commissioner on Climate Change, and H.520, all of which have been characterized by unreliability. Consensus that climate change pose risks to Vermont has not been matched with resources, capacities, expertise, etc., to match the scale of the risks. The first sign of an emerging consensus on peak oil or liquid fuel consumption was the all heating fuels efficiency utility that was to be created by H.520. No state Agency or Department is tasked with addressing peak oil, and even if domain consensus that climate change and peak oil are problems and organizational forms for addressing both were in place, it is still the case that government interviewees are overwhelmed by existing problems, conditions, and priorities.

5.3. Big Picture Communication and Coordination:

► **The Cognitive Practices of Individuals Within Each Government Organization**

Hannan and Freeman suggest that the ability of organizations to adapt is constrained by internal and external sources of inertia, including constraints on the flow of information. In contrast, HROs have fewer accidents because organizational leadership has developed systems and processes for communicating the big picture to everyone in the organization, and encourage their members to

talk about how what is happening affects the entire organization (Roberts and Bea, 2001: 75). Every state employee expressed frustration with the level of coordination and communication. Interviewees chalked it up to confusing mandates, the compartmentalization of activities, and the lack of any kind of planning or coordinating entity that provides leadership to address peak oil and climate change. The issue of coordination to address peak oil and climate change can be summarized with this observation: the Director of the Department of Emergency Management, an expert on planning for the worst, with an educational background involving research on climate change, was not a member of the Governor's Commission on Climate Change. Several other interviewees were not aware of the Governor's Commission on Climate Change, with one person asking me, "Do we have marching orders?" The Department of Information and Innovation, which develops and implements telecommunications technologies for work-at-home situations, was never mentioned in the context of preparing for peak oil and climate change, even though it is ideally suited to reduce travel and fuel consumption. The presence of official representations of leadership and domain consensus that at least climate change is a problem did not seem to improve lines of communication or coordination within state government.

► **Organizational Characteristics**

During the course of Vermont's societal development, each Agency and Department "structurated" to serve particular needs, resulting in compartmentalized, fragmented, silos. Organizational schemas support this fragmentation, as the following quotes reveal:

SS: In general, do you interact with other Agencies with regards to these topics?

> "*To be honest with you, I compartmentalize pretty well. Energy issues are generally* [the Department of Public Service's] *issues. Climate change issues are generally* [the Agency of Natural Resources] *issues. Tying the two together is* [the chair of the Governor's Commission on Climate Change's] *efforts. So, for us, I know that other Agencies have the lead on those issues from a policy standpoint and BGS from a buildings standpoint. And so for me it's not something that I engage in. Climate change as an issue for me...is not an issue. Having said that, we do put a lot of emphasis in the Department of Economic Development on so-called Green Valley industries, many of which are oriented toward renewable energy and things that will 'exploit' the notion of global warming to drive a business sector to make it grow here. So, from that perspective, we're very much involved."*
> **-ACCD**

"State Government is compartmentalized. As a bureaucracy it is compartmentalized. It is difficult to look at and portray the bigger picture. Climate change and peak oil are very much interrelated. Climate change is given to the Agency of Natural Resources. Peak oil, if it's given at all, if it's discussed at all, is not given to the Agency of Natural Resources. The Public Service Department, the Public Service Board, will likely deal with energy issues. The Health Department surely has a role in all of this because there are health consequences. They'll be dealt with separately. It may be some time before Vermont's state government begins to pull it all together and weave a more holistic approach to it. It's very fragmented."

SS: Why is coordination amongst Agencies such a challenge?

"Well, there's no state planning office. There's no inter-Agency forum. There's no forum. The Governor has his executive staff but they don't meet regularly. There's no forum. There's no one doing economic analysis. There's no one doing population analysis. There is no state planning office."
-AoT

► **The Environment of Organizations**

As mentioned previously, the ability of organizations to adapt, in this case, to communicate and coordinate more effectively, is constrained by internal and external sources of inertia, including confusing mandates, risk aversion, legitimacy constraints (or the quest for legitimacy), and competition for budget allocations (Hannan and Freeman, 1977). The first quote suggests that the Governor's quest for legitimacy on climate change through the GCCC conflicts with existing mandates of the Climate Neutral Working Group.

SS: How would you characterize the level of coordination within Vermont's Agencies, Departments, and the Legislature with regards to preparing for, mitigating against, or adapting to climate change?

"Non-existent. We have multiple mandates that are so confusing that it's almost impossible to determine which goals you're trying to achieve, which drives me absolutely nuts. I mean, that was one of the problems, there's the Governor's Commission on Climate Change, they have some goals that are much more aggressive than the greenhouse gas goals that are already in place through the executive order. I am scared to death of what they are trying to do. They are way out, way too aggressive. And I think that's a problem."
-BGS

The following two quotes are interesting: from one perspective, the restructuring of the Agency of Natural Resources, including the creation of a Center on Climate Change and Waste Re-

duction, is viewed as an integrating activity. From another perspective, the restructuring is viewed as a divisive strategy that stands in the way of inter-Agency coordination.

> "*It's tough. It's not easy to do because you're dealing with a very different way of doing things. People are very comfortable within their own areas. And now they're extending out of those and breaking those walls down and it's very hard. We're comfortable in our little domains but at the same time we know that if we start integrating different thoughts and different ideas we get a much different picture of what's going on. I'll give you an example of that. If you go back to the development of the Interstate highways after the 50s, the whole focus was to build this highway system for military purposes. And they went through many of the cities on the east coast and other places where they cut the fabric of that city in two: Boston, Philadelphia. What they never realized was that the price that was paid in the social fabric of that community. Some real mistakes can be made, not because people aren't trying to do the right thing, but they just don't have the overall balance of knowledge."*
> **-ANR**

> *"We believe it's truly an inter-Agency issue* [climate change]. *It's not something we can do alone. We here in the planning division are pushing all the time for inter-Agency cooperation. And it's like knocking heads together. I can't believe ANR is talking about a center on climate change that doesn't involve other Agencies. Go figure that out. That doesn't make any sense to me."*
> **-AoT**

In summary, confusing mandates, the compartmentalization of activities, and the lack of any kind of planning or coordinating entity that provides leadership to address peak oil and climate change chokes up lines of communication. The presence of official representations of leadership and domain consensus that at least climate change is a problem did not seem to improve lines of communication or coordination within state government. The ability to communicate and coordinate more effectively is constrained by internal and external sources of inertia, including confusing mandates, risk aversion, legitimacy constraints (or the quest for legitimacy), and competition for budget allocations.

5.4. Aggressive Information Seeking:

► **The Cognitive Practices of Individuals Within Each Government Organization**

All interviewees were familiar with climate change and were cognizant of the negative implications of climate change. In fact, all interviewees have been personally aware of climate change for a minimum of three years, with most saying they have known about it for many more years. All interviewees except one were old enough to remember living through the 1970s oil embargo, and anticipation about the implications of *resource shortages* led to a range of state government efforts aimed at energy efficiency and conservation (described in Section 5.6.). All of the interviewees only became aware of the phrase 'peak oil' within the past three years, through such venues as Kunstler's *The Long Emergency.* An intuitive understanding or perception that peak oil and climate change pose risks to Vermont does not appear to have led to aggressive information seeking, planning, coordination, etc. The following quote from the Department of Public Service illustrates this point:

SS: Has your agency done any prior planning for climate change or peak oil? Any documents that say this is what we're going to do when the liquid fuel supply runs short?

> *"No. This Department puts out both a 20-year electric plan and a comprehensive energy plan. The last comprehensive energy plan was in 1998. We're putting out a new one now. I'm probably sure that it doesn't say something like 'here's how we're preparing to deal with societal energy needs when oil runs out.' I think it's more of a 'here are the issues around a tightening supply of fossil fuel and the environmental impacts and here's how we should deal with it.' I don't think it's as long-term a planning process, or at least what was looked at as a long term plan. If there's a good argument that peak oil is a 50-year phenomenon then we need to start planning today. But I don't think that's happened in planning within our Department. We haven't had that kind of discussion about peak oil and fossil fuels drying up in the future."*

► **Organizational Characteristics**

At an organizational level, the Agency of Natural Resources conducted comparative public risk assessments as far back as 1990-1991, and climate change came out near the top of every risk category (e.g., quality of life risks, human health risks, and ecosystem risks). However, very little transpired to address those risks in the intervening years. State Agencies and Departments are particularly crushed under the weight of existing sunk costs, mandates, budgets, and time commitments that constrain their abilities to focus on peak oil and climate change. Additionally, this time-span was

characterized by uncertainties that "underpin scientific claims about climate change," (Rosa and Dietz, 1998: 440), including the "dueling scientists scenario" advanced by ExxonMobil and other major corporations (McCright, 2007; Union of Concerned Scientists, 2007), as well as cyclicity in media coverage of climate change (McCright and Shwom, 2007). In the following quote, an Agency of Natural Resources staffer reflects on the time lag between the comparative risk assessments and the recent efforts to re-organize the Agency to address climate change:

> *"The time lag in my mind is embarrassing. However, I think there are probably a lot of mitigating factors. There was, and continues to be, a great deal of misinformation. [Michael] Crighton's book is just a wonderful example of misinformation. I think that the public is now beginning to see through that. Gore's film, Hansen's brave presentations, are making it more and more difficult to lend any credence at all to the skeptics. I think that there's growing momentum for climate change. We are so far from taking this issue seriously, and that too is embarrassing. But I understand that social change comes slow and part of it is that our own federal government was undermining much of the work that was being done on it."*
> **-ANR**

Although each staff level interviewee suggested that they had a means of sharing their concerns with supervisors, their personal anticipation that climate change and resource shortages posed a threat *several* years ago did not lead to consistent, reliable Agency/Department planning. When planning or activities for climate change did show up recently it was largely due to outside forces, as evidenced by Vermont's participation in the New England Governors and Eastern Canadian Premiers conference (described in Section 5.6.). Now that there is domain consensus that climate change is a problem, the Agency of Natural Resources is going through a restructuring process that is moving existing divisions and departments into new "Centers," including a Center for Climate Change and Waste Reduction. As noted in the previous section, personnel from other Agencies view the Center for Climate Change and Waste Reduction as divisive. As the following quote reveals, even within the Agency of Natural Resources, the new center is not viewed as an attempt to promote aggressive information seeking but rather as a public relations stunt to give the social representation of action.

> "*The reorganization is a public relations stunt. There is nothing about the proposed reorganization that is going to provide the Agency with a better means to address real problems. What the reorganization could do, if it plays out successfully, is put the Agency in a position where it can make better use of what are going to be limited resources.*

What has been overlooked here is there is absolutely no portion of the reorganization that addresses management. Managers are not part of this. There is no indication that managers will be held to any accountability…in order for what's been proposed to play out constructively there has to be a focus on management. Staff does not the capacity to decide to do this versus that. That is one of the big challenges that ANR has not faced up to, that is, over time individuals acquire more to do without having a cutting of other things. That's a management function…It really has been the case that building capacity comes through acquisition of federal funds…Federal funding is not in perpetuity, it waxes and wanes…Management doesn't take the initiative to say, "The money's gone, we can't do this anymore." We've reached the point of we don't have the money to do what we're set up to do. There has never been anyone who's stepped up and said, "Manage ment needs to go into a retreat and reorganize what we do rather than how we look."
-ANR

With regards to peak oil, no Agencies or Departments are specifically tasked with aggressively seeking out information to prepare for, mitigate against, or adapt to the problem. That is starting to change as the Agency of Transportation is now considering, at least, rising fuel prices in their transportation models:

"Petroleum runs this state and if it's not available it's going to be a problem. Someone will ask 'Government's not good at planning at 30 year windows and politicians don't want to think past their terms', so yes it's an issue. How does government respond to it is a real challenge. We write a 20 year transportation plan that gets updated every five years for the Feds as part of our requirement. We're in the re-write right now and we're running some scenarios at $9 a gallon of gas. We had a big day-long workshop with a bunch of experts in June and the consultants are writing up the report on that...So, peak oil as a concept specifically, no, but the idea that the price of fuel is going to increase, as a transportation planner you have to recognize that or you're not doing your job."
-AoT

► The Environment of Organizations

Even with anticipation that climate change and resource shortages/peak oil are problems, many interviewees were nevertheless blown away at the speed at which climate change and energy issues have risen to the surface which, again, indicates that personal and organizational concern did not translate into aggressive information seeking. The first quote comes from a nonprofit organization and the second comes from the Secretary of an Agency:

"I think it's fascinating what's happening...we're seeing everywhere we go a pot boiling around sustainability and around energy planning that wasn't there two years ago. Vermonters are comfortable with the background of the green economy and sustainability

because it's sort of part of the state's sensibility, but, it's boiling today.

"I would have to say, every biennium, and if you work in government you tend to measure in bienniums, there's an issue that comes along that emerges as the big issue. This one emerged very quickly, seemingly, and out of virtually no place. I mean, just all of the sudden, BOOM, there it was the first day of the Legislature- this is going to be the climate change biennium. I think it's rare that it happens like that. I'm looking back at the other big issues, the property tax issues that drove Act 60, the other one was Civil Unions, but even Civil Unions didn't pop up as the focus as quickly as, seemingly as quickly as, this did."

In summary, contrary to Diamond's hypothesis [2005], it will not be a lack of anticipation and perception that dooms today's societies. All interviewees were aware of climate change and most had detailed knowledge about peak oil. All interviewees perceived that climate change and peak oil pose risks to Vermont, especially over the long-term. Anticipation on the part of government employees that climate change and resource shortages/peak oil could pose problems for Vermont does not appear to have led to aggressive information seeking, planning, coordination, etc. Rather, outside forces–the oil embargo, participation in the New England Governors and Eastern Canadian Premiers conference–appear to have triggered state government reaction. Now that climate change and, to a lesser extent, resource shortages/peak oil are on the table, the Department of Buildings and General Services did recently attempt to identify state government energy consumption and emission data, the Department of Public Service is holding public meetings on Vermont's energy future in October 2007, and the Center for Climate Strategies (the consultant hired to facilitate the Governor's Commission on Climate Change) collected emission information and calculated stabilization wedges. Even with anticipation that climate change and peak oil pose problems, state government personnel appear to have been caught off-guard by the rapid emergence of these issues.

5.5. A Structuring Mechanism:

► The Cognitive Practices of Individuals Within Each Government Organization

Structuring mechanisms, such as incident command systems (ICS), are characterized by three main features: 1) a structuring mechanism that establishes the ICS at the beginning of an incident,

and also allows for the possibility of "role switching" (i.e., the reassignment of personnel) and "authority migration" (i.e., the decoupling of authority from hierarchies to individuals who possess the most expertise); 2) support for constrained improvisation; and 3) a "cognition management" methodology that devotes considerable attention and resources to developing, communicating, and connecting individuals' understandings of the situation (Bigley and Roberts, 2001: 1286-1291). The lack of a 'structuring mechanism' for addressing peak oil and climate change makes communication and coordination very difficult, provides neither an incentive for aggressive information seeking, nor a direction for planning. Vermont has a nascent structuring mechanism in the form of the Climate Neutral Working Group and possibly the Center for Climate Change and Waste Reduction, as well as a temporary mechanism in the Governor's Commission on Climate Change. For the most part, however, staff-level employees improvise and *become* structuring mechanisms themselves, as the following quote specifies:

SS: Is there anything about the way your Agency is organized that inhibits action on peak oil (climate change)? (E.g., what are areas that need improvement?)

> *"Well, you know, we have a planning division and the planners are off doing it here. How do you get the rest of the organization to buy in? You do that by getting executive staff behind whatever we're doing. But it would be good if there was an interdivisional way of getting it bought into. Whenever I do anything I go to the divisions and pull people in to make sure they're engaged in the planning work. You have to, because there's not a mechanism in the front office to do that. There's no staff.*
> **-AOT**

► Organizational Characteristics

As noted in Chapter 1, in 2003, Governor Douglas signed Executive Order #14-03, creating the Climate Neutral Working Group (CNWG) which is responsible for helping state Agencies and Departments reduce greenhouse gas emissions from state government buildings and operations. The results of these efforts have not been significant to date. The second biennial CNWG[32] report found that "It is apparent that Vermont State Government is faced with a substantial challenge to reduce energy consumption and CO_2 emissions consistent with the goals" of #14-03. Emissions related to building space heating and building electricity consumption increased, while state vehicle fleet emis-

32 Url: http://www.anr.state.vt.us/air/planning/docs/cnwg%202nd%20%20Biennial%20Report%204-2007.pdf

sions decreased slightly from 2005 to 2006, mainly due to the purchase of 25 Honda Civic hybrids. However, the CNWG does not expect to see any emissions reductions in employee commuting, since no programs or incentives have been developed. Interviews with government employees involved with the CNWG revealed difficulties from the get-go: "We were charged with really kicking the Climate Neutral Working Group in the ass and making things happen because it was deadly. We could not get out of our own way on the Climate Neutral Working Group until [Governor] Douglas said 'screw it' and gave it to BGS [the Department of Buildings and General Services]." BGS then had to do "quite a few gymnastics" to collect energy use information for the buildings it manages, and spent a huge amount of time collecting and creating missing data for other Agencies in order to establish a baseline profile of state energy use and greenhouse gas emissions (i.e., it aggressively sought out information).

Interviews for this project revealed communication problems (including canceled and irregular meetings), lack of domain consensus, a sense that some of the reports utilized were whitewashed, turf issues around which Agency/Department is responsible for which activity, and coordination problems. CNWG, Interviews for this project revealed communication problems (including canceled and irregular meetings), lack of domain consensus, a sense that some of the reports utilized were whitewashed, turf issues around which Agency/Department is responsible for which activity, coordination problems, and, especially a lack of funding:

> *"That's why we're beating our heads against the wall. On top of being tasked to do this, we're told we have no budget."*
> **-BGS**

For the reasons noted previously (i.e., lack of domain consensus), there is no structuring mechanism for coordinating response to peak oil.

► **The Environment of Organizations**

All interviews with state employees identified a lack of resources (e.g., skills, money), current mandates or commitments to long-standing problems, or the fact that they are not specifically tasked with addressing peak oil and climate change as major factors constraining their decisions. This was also the case with the CNWG. Now that the CNWG has gathered baseline energy consumption and

emissions data for state facilities and vehicles, it has focused attention on encouraging executive management to take the CNWG's agenda seriously, since the examples set by the leaders of the various Agencies and Departments influences organizational culture:

> *"If you can't get the leadership to buy in, you're not going to get the people to understand that it's an important culture change. So we're trying to get the leadership to understand that when they hear something about this not to laugh or make a comment, be cause your subordinates just saw it. We're hoping that if we can do a culture change that will be the biggest item, starting with our group, getting them to understand that it's serious enough to show up at the meeting."*

In summary, Vermont has a nascent structuring mechanism in the form of the Climate Neutral Working Group and possibly the Center for Climate Change and Waste Reduction, as well as a temporary mechanism in the Governor's Commission on Climate Change. However, significant communication problems (including canceled and irregular meetings), lack of domain consensus, a sense that some of the reports utilized were whitewashed, turf issues around which Agency/Department is responsible for which activity, a limited budget, and coordination problems have impacted the effectiveness of the CNWG. There is no structuring mechanism for coordinating response to peak oil.

5.6. Extensive Training & Planning

► The Cognitive Practices of Individuals Within Each Government Organization

Diamond (2005) hypothesizes that lack of anticipation and perception help to explain why prior societies collapsed (i.e., Easter Islanders did not anticipate that chopping down all of the trees would lead to collapse). The work of Anthony Downs, Ulrich Beck and other research on the social construction of risk and social problems more generally also indicates that risks are contested and compete with other issues for attention. In contrast to the argument advanced by Diamond, almost all interviewees perceived climate change and peak oil to be risks in the short-term, while all of them perceived both to be problems in the long-term. In support of the social constructivist perspective, government action to address climate change and resource shortages were influenced by the issue-at-

tention cycle (Ungar, 1995) and changing perceptions of risk. All interviewees except one were old enough to remember living through the 1970s oil embargo and price shock. Anticipation about the implications of *resource shortages* led to a range of governmental, private-sector, and popular efforts at various scales aimed at energy efficiency and conservation. These efforts have been cyclical in nature, starting with the oil embargo in 1973, which led to energy efficiency and conservation measures, which then "tapered off" as gas prices dropped in the late 1970s - early 1980s. Another generation of energy improvement projects (including the installation of wood chip heating systems at two state complexes) lasted from the mid 1980s until about 1995 when debt issues ceased projects such as building envelope changes. Climate change as a widely-discussed public and political issue did not show up until around 2000, when the New England Governors and Eastern Canadian Premiers conference started talking about it. In 2002, then Vermont Governor Howard Dean signed an executive order establishing the Climate Neutral Working Group, Governor Douglas re-authorized the CNWG in 2003, following his election. Anticipation about resource shortages, specifically peak oil, has not led to a similar type of working group. Meanwhile, and despite these efforts, Vermont's energy use and greenhouse gas emissions have continued to rise (Figure 2).

The differences between peak oil and climate change–and the solutions to each–were frequently not intuitive to interviewees. For example, an Agency Secretary explained how his understanding of peak oil is wrapped up in the context of the Governor's concern about climate change.

> *This Agency is concerned about climate change. I mean, I know there's a nexus between the two* [Meaning peak oil and climate change]*, but the stronger connection there is to climate change, because the Governor has directed us in what we do in the need to be sensitive to the issues of climate change and how we run our Agency... I need to understand more fully the connection between peak oil and climate change. For me, I can see how the issues are related but they're separate issues in my mind. The Governor is very concerned about climate change and he's very concerned about the energy we use and being efficient in the energy we use as we run our Agencies, what automobiles, turning the lights off. All those things that are climate change related. They also happen to be related to peak oil, but he's expressed it in the terms of climate change."*

Many interviewees expressed a view that the solutions to peak oil and climate change were the same thing: reduced petroleum consumption. Although this is a 'true' statement in the sense that reducing consumption will delay the onset of the peak of world oil production, very few interviewees

were able to articulate solutions beyond biofuels to peak oil specifically. And this view certainly does not reflect the severity of the *Hirsch Report's* conclusion that reducing petroleum consumption will be "chaotic" without government intervention. Only one interviewee was very distinct in his description of the differences between climate change and peak oil preparedness:

> *"...there are also a whole other set of actions, preparedness actions that may or may not tie into climate change preparedness. They at least are not generally on the radar of climate change people, and that has to do with how you deal with a society whose life blood is ebbing. We import 95% of our food in Vermont. It comes here by truck for the most part... The three areas that I look at for peak oil affecting us in Vermont are: how are we going to eat? How are we going to keep warm in the winter? And how are we going to from A to B in transportation?"*
> **-Nonprofit**

► **Organizational Characteristics**

All interviews with state employees identified a lack of resources (e.g., skills, money), current mandates or commitments to long-standing problems, or the fact that they are not specifically tasked with addressing peak oil and climate change as major factors constraining their decisions. As noted in Section 5.5., the one structuring permanent mechanism devoted to addressing climate change is marked by communication, coordination, and funding problems. The next two quotes highlight the fact that, in lieu of resources, staffers turn to counterparts in other Agencies or Departments. The first comes from the Department of Public Service, the organization responsible for state energy planning. The interviewee identifies a lack of departmental expertise on climate change that they attempt to fix by working with ANR. The second quote is in response to a question posed to an employee at ANR that asked about the level of resources committed to addressing climate change. It demonstrates that ANR itself has yet to devote significant resources to climate change:

> *"We don't have expertise in all areas of energy because we're just too small. From that perspective we need to rely on—and I don't think it necessarily inhibits our policy-making efforts—other experts that we rely on. But we don't have an expert on climate change on staff. We're going to rely on the folks at ANR to provide that information but it's certainly going to feed into our planning expertise."*
> **-DPS**

"I would say right now it's very small. A small amount. I would say it's probably 5% at the most. But I know it's going to change as we go forward."
-ANR

As noted in Chapter 2 (Page 81), 85 percent of total Agency budgets goes to the Agency of Human Services and the Agency of Transportation. The following quote comes from an employee of the Agency of Commerce and Community Development. It reflects the fact that budgets are committed to existing programs and topics, thus making it difficult for climate change and peak oil to find traction:

Let me give you a primer on what we've done. Our budget is about a little over $30 million. If you consider the fact that the State of Vermont spends about $4.5 billion in total funds, it's less than a tenth of a percent. If you make it on a pie chart it's just a line because you can't see the coloring. It's a tiny budget compared to overall government spending...So, funding for us, being able to promote the Green Valley in this particular case, it's not because the Governor doesn't want to put money into this, we've got Medicaid challenges, we've got teacher retirement challenges, we've got some other Human Services related challenges like we need to build a new hospital, we need to get people out of buildings that are sick and so on. And those things take precedence. We do the best we can with the money we get. Frankly, that's why we magnify [our effort] *by working with private partners."*
-ACCD

► The Environment of Organizations

State employees frequently turn to colleagues in other Agencies and Departments for assistance, but communication and coordination on peak oil and climate change is quite limited and fragmented, and every Agency and Department faces resource constraints.

In summary, in contrast to the argument advanced by Diamond (2005), almost all interviewees anticipated and perceived climate change and peak oil to be risks in the short-term, while all of them perceived both to be problems in the long-term. This concern has translated to recent planning efforts to address climate change that have been marked by communication, coordination, and funding problems. No planning efforts to address peak oil have developed yet. At the same time, the difference between peak oil and climate change–and the solutions to each–were frequently not intuitive to interviewees. State employees frequently turn to colleagues in other Agencies and Departments for

assistance, but communication and coordination on peak oil and climate change is quite limited and fragmented, and every Agency and Department faces resource constraints.

5.7. Decentralized Decision-making:

► **The Cognitive Practices of Individuals Within Each Government Organization**

The possibilities of "role switching" (i.e., the reassignment of personnel) and "authority migration" (i.e., the decoupling of authority from hierarchies to individuals who possess the most expertise) are key to the performance of high reliability organizations. Although personal concern, anticipation, and perception about climate change were widespread, they did not appear to lead to organizational concern or to consistent, reliable Agency/Department planning, even though all interviewees suggested that it was possible in each Agency or Department to share their concerns with supervisors. Recalling the 'peasant outside the castle walls' scenario described earlier, it would appear that the practice of decentralized decision-making is not valued (with regards to peak oil it is actively discouraged).

► **Organizational Characteristics**

In the case of Vermont's only Agency/Department based structuring mechanism, the Climate Neutral Working Group, leadership and decision-making authority were not bestowed upon staffers with the capacities to advance the CNWG's agenda. Rather, the Commissioners of other Departments, who frequently miss meetings, or frequently subordinates who have a limited interest in attending CNWG meetings are involved. The following quote, from a staff-level employee involved with the CNWG, describes the frustration of this situation:

> *"The group is primarily Commissioners. They're the ones that are technically the CNWG. Then they brought in all the worker bees to provide the technical expertise. What happens is, this is the only group I've seen that's been struggling, you know, canceled meetings, or, "We'll have this by next meeting," and you get there and nothing's been done. What happens is, it's the only group I go to where the Commissioners are sitting in the seats. They have so many other priorities so I think what ends up happening is somewhere along the way this gets lost, "We'll do it next month." It keeps getting shoved aside. And all the worker bees, with the technical background that we have, keep hinting that, "Maybe you should just give it to us and we'll just pass things through to you to review." So far we haven't been able to get them to make that change. That's the hard part with that group.*

We've been keeping it alive. We all get together when the Commissioners stop talking and try to get it to go."

► **The Environment of Organizations**

Each Agency and Department is constrained by existing sunk costs, mandates, budgets, and time commitments that constrain their abilities to focus on peak oil and climate change. Additionally, since political appointees have frequently changed over the course of the Douglas Administration, many upper level managers spend a fair amount of their time putting out fires, getting acquainted with their staff, re-establishing priorities, and re-establishing trust.

"When I took the job a year and a half ago, it was sort of a dysfunctional office just because they'd gone through a series of directors over the past four or five years. And so, it's requiring a lot of 'You do the programs. This is where we're going. Yes, you're accountable for your program. No, I'm not going to be leaving any time soon.' So, running the day to day stuff and getting that organized is my top priority. My next priority is look ing at the long-term: where are we going to go from now?"
-Department of Emergency Management

Although personal concern, anticipation, and perception about climate change were widespread, they did not appear to lead to organizational concern or to consistent, reliable Agency/Department planning, even though all interviewees suggested that it was possible in each Agency or Department to share their concerns with supervisors. It appears that domain consensus about problems needs to come from the Governor or Legislature, even though staff-level employees may be more knowledgeable than their supervisors. The lack of decentralized decision-making presents a real problem, especially to the extent that frequent turnover in senior management can derail momentum since time is required to renew trust, re-establish priorities, and put out fires.

5.8. Summary

Theories generated in the sociology and environmental sociology literatures largely support my thesis that–despite the risks posed by peak oil and climate change, and despite being the "greenest state in the country"–Vermont's state government is not acting reliably to prepare for, mitigate against, and adapt Vermont to peak oil and climate change. The research described here suggests that the deci-

sion-making context of state governments–the cognitive practices of individuals within organizations, organizational characteristics, and the environment of organizations–seriously impedes a reliable response to preparing for, mitigating against, and adapting to peak oil and climate change. While some of the cognitive practices (e.g., concerns, risk perceptions, experiences, attitudes, etc.) that government workers hold have led to domain consensus that climate change is a problem, this consensus has not been enough to ensure strong leadership, as other beliefs such as political ideologies preclude certain types of policy options (e.g., Governor Douglas's anti-tax stance), and the structure of the branches of state government diffuse leadership (in the case of the Legislature) or deny it (in the case of staff-level employees). A lack of leadership ripples through other characteristics of high reliability organizations, since big picture communication and coordination are difficult without a focusing voice.

Personal concern, anticipation, and perception about climate change did not appear to lead to organizational concern or planning, even though all interviewees suggested that it was possible in each Agency or Department to share their concerns with supervisors. Rather, aggressive information seeking about climate change seems to have appeared only during this past year, due to increased public awareness and media coverage, *An Inconvenient Truth*, as well as the concern expressed by the Governor and Legislature. The practice of decentralized decision-making did not appear to be valued. This is a major oversight, since staff-level employees are frequently more knowledgeable about peak oil and climate change than upper-level employees, and especially to the extent that the official representation of leadership is not believed by staff-level employees. Frequent turnover in upper-level management can also derail staff-level momentum in addressing peak oil and climate change, since time is required to renew trust, re-establish priorities, and put out fires.

Lack of leadership is not enough to subvert efforts to prepare for, mitigate against, or adapt to climate change and peak oil. The Agencies and Departments that make up Vermont's state government are crushed under the weight of sunk costs (e.g., road maintenance), existing time commitments, mandates, priorities (e.g. health care), and a lack of additional budgetary resources for addressing peak oil and climate change. As a result, state employees frequently turn to colleagues in other Agencies and Departments for assistance, but communication and coordination on peak

oil and climate change is limited and fragmented. To date, Vermont's main structuring mechanism for addressing climate change, the Climate Neutral Working Group, has been characterized by the absence of features of high reliability organizations: significant communication problems (including canceled and irregular meetings), lack of domain consensus, a sense that some of the reports utilized were whitewashed, turf issues around which Agency/Department is responsible for which activity, a limited budget, and coordination problems.

Several surprises emerged during the course of these interviews. First, the "dueling scientist" perspective was not supported. The social construction of climate change risk is a big topic in environmental sociology (Williams and Frey, 1997; Rosa and Dietz, 1998; McCright, 2007), and the 'relativism' generated by this approach is believed to inhibit action. In Vermont, however, Republican and Democrat alike agreed that climate change is a problem (even the dissenters, who disagree on the origins of climate change, agreed that its impact will be substantial). Second, the relatively straightforward ability of treadmill of production/power elite forces to trump Vermont's most substantial ecological modernization policy to date (H.520), was not expected. As the allegedly "greenest state in the country," I would have anticipated that the Legislature and organizations in favor of H.520 (including Vermont Businesses for Social Responsibility- the largest business trade organization of its kind in the United States) would have rallied to override the Governor's veto. Third, I had found Diamond's explication of the collapse of past societies very compelling. That is, it seemed likely to me that a lack of anticipation and perception could lead to societal collapse. However, interviews completed for this project indicate that government response to peak oil and climate change has been weak, even though *all* interviewees were aware of climate change and peak oil and most perceived the problems to be risks, suggesting that anticipation and perception are necessary, but not sufficient, conditions for avoiding societal collapse. Diamond also suggests that "even after a society has anticipated, perceived, or tried to solve a problem, it may still fail" due to a lack of capacity, prohibitive expense, or a response that is too little, too late (2005: 436). Research completed for this study indicate that, while a lack of capacity and resources are indeed problems, a wider range of factors influencing the decision-making context are also implicated, suggesting that both deeper analysis of the collapse

of previous societies is and a greater appreciation of the factors that can lead to future collapse is required. Finally, the relative lack of concern or organizational focus on peak oil was unexpected and troubling. Vermont is utterly dependent on petroleum for transportation, and the frequent conflating of climate change and peak oil as the same problem masks the potential wrenching consequences of declining oil reserves.

One concept advanced in the environmental sociology literature, the human exemptionalism paradigm, was not found to be helpful in explaining Vermont's decision-making context. Every interviewee believed that Vermont is going to be impacted in some way by peak oil and climate change. Instances of interviewees describing something in a way that was reminiscent of the human exemptionalism paradigm were rare. For example, in the quote below an interviewee expresses optimism that human ingenuity and technological developments will help us meet our energy challenges.

> *"I'm also optimistic about humans and their ingenuity and their inventiveness to, you know, either through the combination of the types of technologies that we use or the types of fuels we may use, to continue with the energy needs that we're going to demand. I know it's probably going to grow, hopefully not at the level it's grown over the past 100 years. We're going to be able to meet those challenges."*

Does this perspective reflect adherence to the human exemptionalism paradigm? The theory of ecological modernization? Or is the interviewee just an optimistic person? I found other factors to be much more relevant for this investigation, particularly Domhoff's perspective on political ideology and all of the organizational theory work on decision-making, suggesting that some of the truisms and taken-for-granted assumptions of environmental sociology may reflect a historical set of conditions that has changed.

6. Conclusion

"The implication is clear: civilizations are fragile, impermanent things."
Joseph Tainter, *The Collapse of Complex Societies*, 1988

The argument advanced here is that, although we know everything we need to know about a whole suite of wedges that can reduce oil consumption and greenhouse gas emissions (e.g., renewable energy, conservation), the decision-making context of governments–the cognitive practices of individuals, organizational characteristics, and the environment of organizations–*currently* does not support the characteristics of a reliable response. As state governments learn, shift gears, and re-calibrate their activities to address the twin challenges of peak oil and climate change, it is important to recognize that the veneer of "greenness," "high policy," official representations of leadership, and technological infatuation may mask underlying structures of unreliability.

At the conclusion of their book on Hurricane Katrina, Cooper and Block suggest that the most important lesson to emerge from the disaster is that "When disaster strikes, we are all on our own" (2006: 306), and the research described here can arguably lead to the conclusion that Vermonters and others should not expect much help addressing peak oil and climate change from their government. *If* present trends continue, future generations may indeed marvel at the Ozymandian ruins of Las Vegas, Los Angeles, and New York City, as they scavenge through the detritus for survival. Old men in Thailand may entertain children with stories of life in Bangkok before it became the new Atlantis. As they huddle around a campfire, burning yellowed student papers for warmth, crotchety sociologists may rail against the capitalist conspiracies, power elites, and exemptionalism paradigms that led to this future, bloody in tooth and claw.

But it does not have to be this way. **Reliability is the flipside of risk**. The development and encouragement of characteristics of high reliability organizations can minimize the likelihood that societies will be unprepared to deal with peak oil and climate change.When disaster strikes, we are *not* all on our own: each of us is embedded in a web of relationships with family, friends, communities, businesses, first responders, governments and ecosystems. Within that web, organizations such as government bureaucracies can improve their ability to coordinate the work of many people to ef-

ficiently accomplish large-scale tasks, including energy and resource planning and disaster preparedness, response, and mitigation. My research supports and encourages an acceleration of the ecological modernization agenda to address peak oil and climate change, but argues that this agenda may ultimately be ineffective if it does not consider the decision-making context of Vermont's state government. As the "greenest state in the country," with abundant resources for biomass energy (including cellulosic ethanol), small-scale hydro, wind, and solar, as well as numerous renewable energy technology businesses and the nationally-recognized programs administered by Efficiency Vermont, one might expect that Vermont would be at the leading edge of the ecological modernization of American society. To date, this has not been the case, and my research makes it abundantly clear that the decision-making context of Vermont's state government is characterized by the absence of gubernatorial leadership and domain consensus (e.g., the lack of articulation of the Green Valley concept), the presence of treadmill of production/power elite forces, a lack of Agency/Department resources as well as other characteristics of high reliability organizations. Closer examination of the decision-making context of governments and other types of organizations (e.g., businesses) should help ecological modernization proponents develop more plausible strategies for changing the behavior of organizations.

Likewise, my research supports Beck's thesis that contemporary political institutions are currently unable to deal with new, complex, ubiquitous environmental and political risks. Where my perspective differs is with Beck's ensuing call for the development of new, 'subpolitical' forms and strengthened involvement of civil society, scientists and professionals, in addressing issues like peak oil and climate change. My experience with one component of these subpolitical forms, non-profit organizations, leads me to the conclusion that, while they are frequently more nimble, they are nevertheless every bit as unreliable as state government in addressing peak oil and climate change. Subpolitical forces will be every bit as ineffective as governments, while the risk magnifies, if they do not intentionally develop the characteristics of high reliability organizations.

Broadly speaking, the problems of peak oil, climate change, and unreliable responses to both, have implications for society *and* sociology. Global climate change has the potential to transform ecological arrangements, including increasing temperature, altering weather patterns (e.g., an

increase in the frequency and severity of hurricanes), changing the composition of local plants and animals and the suitability of crops, etc. It also has the potential to directly impact social arrangements, through increased insurance rates, the spread of tropical diseases, growing heat-related deaths, etc. Peak oil means that the supply of readily available oil and oil-related products will decrease. Together, global climate change and peak oil call into question how we live, where we live, what we can do, where we can go and what we study. The job of the sociologist, in this context, is to prevent ecological ruin and societal collapse from happening by illuminating problems in the decision-making context and through developing the capacity for reliability in all types of organizations. My argument, therefore, is for the development and articulation of a more muscular, active sociology that works with government officials, nonprofits, businesses, and other types of organizations to remove barriers, reduce risks, and pursue sustainable development opportunities.

The characteristics of high reliability organizations are simple to understand but difficult to develop if a commitment to reliability is not evident. Other states can learn from Vermont's experience by electing strong leadership, developing and *funding* structuring mechanisms, and encouraging decentralized decision-making. Within Vermont's state government there are instances where the decision-making context is trending towards reliability. The Agency of Transportation, for example, now has workshops, training sessions, Agency-wide e-mails, and other efforts to educate staff about climate change. The key challenges in continuing that trend are "getting the leadership to buy in right at the beginning," encouraging aggressive information seeking by creating, for example, a Peak Oil Working Group, and rewarding staff-level employees for their hard work by amplifying their ability to make decisions and act as leaders.

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