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Energy Management and Governance in Vermont: A Case Study

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Abstract

Environmental management has always been important for global sustainability and has becoming even more critical in the face of climate change, the expansion of the global economy, and explosive population growth. Energy resource management is one of the critical areas that need to be address on the international, national, state and local levels. This paper presents a case study of the state of Vermont's efforts towards energy management. Special attention is paid to governance of its energy systems and the ensuing results. The research looked at the energy supply and consumption profiles of the state, how those factors influenced policies, and highlights of selected policies.

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I. Introduction

Much of the wealth of the United States is derived from the abundance of natural resources; the ability to extract these resources for consumption and production contributes to the current GDP of approximately 14.2 trillion dollars[1]. While there are both federal and state guidelines, and policies aimed at managing natural resources, there is still much to be done to improve the management and protection of these resources to prevent their depletion, and to ensure that current and future generations will be able to depend on them for social, economic, and political survival. Because natural resources management, or environmental management, is such a large and complex issue, it requires cooperation and goal-sharing among governments, the private sector, and individuals.

In the US, much of the management of the environment on the national scale is the handled by the US Department of the Interior (DOI) and the US Environmental Protection Agency (EPA). The DOI is primarily responsible for the management of natural resources, and land use, while the EPA's functions include enforcing regulations pertaining to the health of the environment and the public. There are also state-level EPA divisions that are charged with administering various programs. Often times however, state agendas and national regulations are at odds with each other, leading to ineffective resources management practices.

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[1] Note: 2010 estimate from CIA World Factbook.
See https://www.cia.gov/library/publications/the-world-factbook/geos/us.html

As the need for natural resources continue to expand with the growth of the global economy and population, responsible environmental management in the US is becoming increasingly more important. Global climate change, precipitated by greenhouse gases emitted from various sources ranging from driving and electricity generation to the of burning of fossil fuels for heating buildings is having a tremendous effect on the US, both economically and environmentally. In a report commissioned by the Natural Resources Defense Council (NRDC) in 2010, it was estimated that by 2050, 1 in 3 US counties could experience high to extreme risk of water shortage due to climate change.[2],[3] The same report highlighted that "in some arid regions (such as Texas, the Southwest, and California) and agricultural areas, water withdrawal is [already] greater than 100 percent of the available precipitation."

The diminishing global oil supply has already had an enormous impact in the US, both economically as high prices have had crippling effects in some industries, and geopolitically, as evidenced by our military conflicts with oil producing countries. Water and oil crises are just two examples of the potentially disastrous effects that failure to adopt and enforce a responsible environmental management system could produce. The complexity of U.S. government bureaucracy requires that environmental management issues must be addressed from multiple angles. Often these issues require strategic planning on the part of local and national government to successfully address

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[2]See: http://rd.tetratech.com/climatechange/projects/doc/Tetra_Tech_Climate_Report_2010_lowres.pdf (p. 23)

[3] See: http://www.nrdc.org/globalwarming/watersustainability/files/WaterRisk.pdf

them. The solutions offered for many natural resources management problems are therefore often a combination of policies, technological innovation and social/behavioral changes.

The concept of energy is at once simple and difficult to understand. For most people it conjures up the idea of some form of physical system ability to do work. In our daily lives we recognize the use of energy when we start our day by turning on the lights, consuming energy that was transferred through the national electric grid after a process that most likely started with the combustion of some form of (fossil) fuel in most of the US. We consume energy when we start the engines in our cars, transforming the chemical energy stored in gasoline into mechanical energy that propels the mechanical components. On the other hand the concept of energy can be hard to grasp, as energy is invisible. As David Goldstein points out in Invisible Energy,

> [e]nergy provides no direct benefit to its users… What you can do with energy is employ it to provide all kinds of other benefits-to maintain a comfortable temperature in your home no matter the weather outside, watch a movie, communicate with a distance friend, provide lighting so you can read at night, or travel to places you want to go. In economic language, these are called *energy services.* (pg.2)

If the concept of energy itself is so difficult to define, how then can policy-makers even create laws and regulations to define its usage, procurement and conservation? Nevertheless, the need for responsible energy policies is one of the most important challenges facing the world on a global level. In the US our policy-makers struggle to create a comprehensive set of energy policies that will provide guidelines for the sustainable management of our energy supply (both domestically cultivated and that

which we procure from abroad), and our energy consumption, knowing that there is a finite amount of energy resources available.

The state of Vermont's efforts to manage its energy supply and usage has been an interesting model of how governance, in conjunction with technological innovation and behavioral change can be a strategy for the sustainable management of energy, and perhaps even natural resources in general. While Vermont is not the only state that has used energy policies, technology and social change to address environmental management issues, its attitude towards, and governance of, energy policies have been interesting. The distinction between governance and government is a very important one in this analysis. Governance as it is used here "relates to decisions that define expectations, grant power and verify performance." Often there is a disconnect between the expectations of a management system, its ability to grant power, and the verification that expectations are met. Vermont stands out in its governance of its energy policies.

Good governance can provide the foundation for the initiatives and decisions that must be made to create responsible environmental management systems. Often there are policies aimed at addressing resource management that lack the foundation that good governance can provide to ensure that the policies will be implemented correctly and successfully. The focus of my research is Vermont's energy policies; what decisions have been made, why they were made, and the effects or results they have had.

II. Practicum Experience and Study Methodology

I completed my practicum as a Policy Research Analyst intern at Vermont Energy Investment Corporation (VEIC), in Burlington VT. During my time there I noticed what I can only describe as a collective, social ethic, geared towards environmental stewardship throughout the state. While performing an impact analysis of the state's energy efficiency utility, I came across many examples of partnerships between community organizations, the private sector, non-profit organizations and state boards and government. Vermont is continually working to diversify its energy profile to ensure that it can always rely on clean, renewable energy sources and, equally importantly, on responsible energy use.

In order to further reflect on the knowledge gained during my practicum and better understand Vermont's position in the continuum of energy policies across the US, I present in this work a case study of Vermont energy policies and related governance processes. Attention is given specifically to policies regarding energy supply, utility regulations, efficiency programs, community involvement and Vermont's plan for a sustainable energy future. The purpose of my research, then, is to better understand Vermont's energy policies, and what role governance plays in their implementation, success and sustainability.

I chose a case-study method for researching this capstone paper because it allowed me to examine different sources in the public domain regarding Vermont energy polices. By examining the different sources available, I was able to identify patterns in attitudes and

behaviors that have shaped the policies of the state. Because my practicum duties focused on policy analysis, much of my research was conducted as a shared phenomenological experience. My primary goal was to learn about the policy environment, and as a policy researcher, in many instances I was often involved in the subject of my research. Some of the duties in my position included brainstorming and formulating the narrative that VEIC presented on the state's legislative advocacy agenda. As stated in Rossman and Rallis, "[r]esearch should have the goal of improving some social circumstance, whatever form it takes" (2003, pg.4). Using this directive as a guide, I worked in hope that my research would lead to positive changes in the state's energy policies, by highlighting both what has worked for the state and what could be improved. In my dual capacity of conducting research for academic and professional purposes, the object of my research was always to provide information that could be used to inform and encourage responsible energy practices that are beneficial to people and planet.

I understand the contextual limits of my analysis, the foremost being that Vermont's energy policies are largely influenced and constrained by policies set at the national, and even global, level. However, I believe it is still important to present this study *because* of the aforementioned constraints. Energy policy-making can sometimes be an exercise in ideological maneuvering. In the US, as the political arena is often entwined with opposing interests, corporate and otherwise, it is often difficult for policy-makers to agree on necessary policies. Because of Vermont's unique characteristics as a small rural state with harsh winters, little to no energy supply of its own, and an economy small in size but deeply sensitive to shifts in energy costs, the state feels a much higher urgency to create

responsible energy policies than, perhaps, most other states in the U.S. These factors in some ways make Vermont almost a perfect "controlled" environment to study energy policies. How has this largely rural state, with no traditional energy resource of its own, with politicians and a citizenry with fewer corporate ties than the average for the U.S. gone about forging energy policies that aim at sustainability and responsible consumer-ship?

I also recognize that I am not unbiased in my analysis, mostly because as stated before, I was also involved and affected by the subject of the study. As the duties of my practicum required that I advocated for certain policies, for example, more renewable and efficient energy, I recognize that my personal and professional biases have likely influenced my analysis of the state's policies. However, while I acknowledge these biases, I continuously sought to present this study with information based on facts.

III. A Look At Vermont

Before the oil embargo of 1973, energy use per capita in the US grew at a steadily increasing pace. The embargo's effect on the car industry, and on the average American's household energy bill, temporarily lowered energy use across the country. However, after 1976, national energy use continued to climb at a steadily increasing pace again. Vermont reacted in the years both proceeding and after the embargo by implementing policies to promote efficient and clean energy use. While Vermont has historically experienced high energy consumption per household due to its long winters and a housing stock that is largely old and energy inefficient, the state has seen moderate

growth of its fossil fuel energy use while experiencing strong economic growth. (See Figure 1 for chart illustrating fossil fuel consumption in relation to state GDP growth).

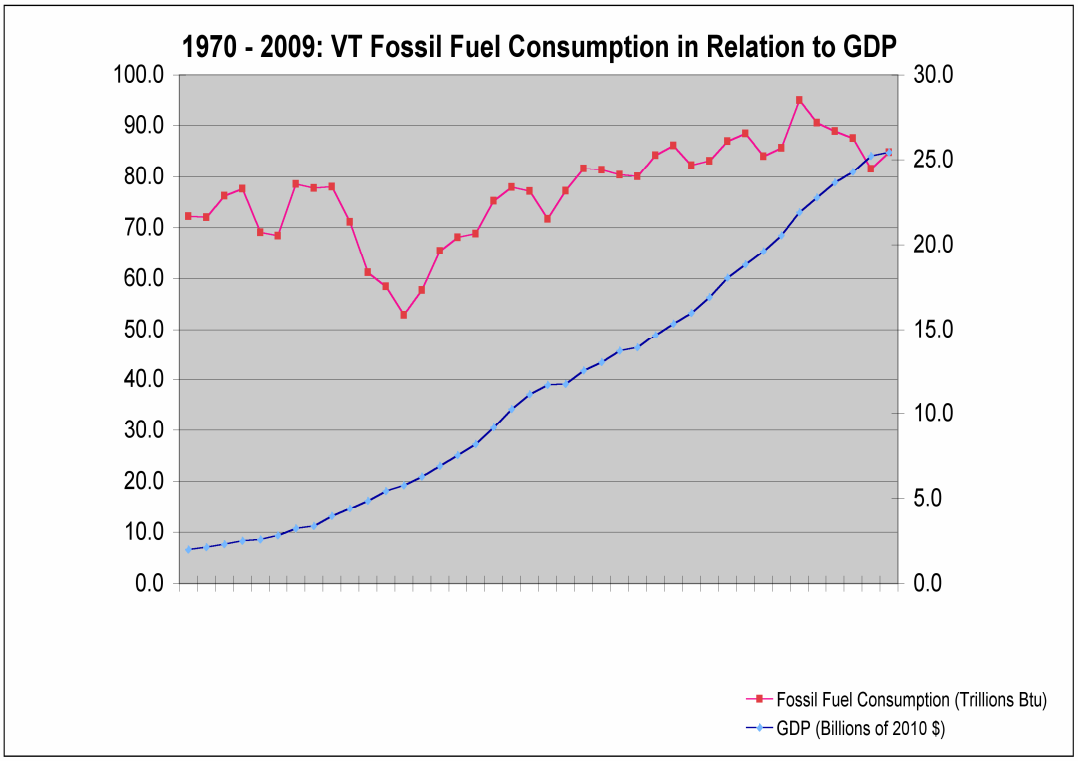

Figure 1: Fossil fuel consumption in relation to VT GDP growth[4]

Evidence of the impact of state policies since the 1980's is that the state has been experiencing per capita electric energy use approximately 20% less than the US average. (See Figure 2). Therefore, while overall energy demand in the state has increased, is closely tied to overall growth in the state, and not necessarily increased per capita consumption

[4] Data used to generate this graph was taken from the Bureau of Economic Analysis. See http://www.bea.gov/regional/gsp/default.cfm?series=SIC

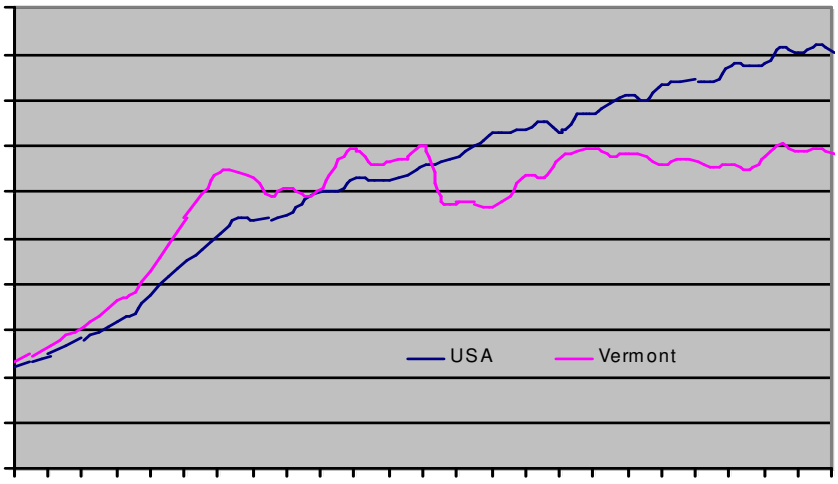

Figure 2: Comparison of Vermont's energy use in relation to the entire USA[5]

In order to understand Vermont's energy policy, it is important to also understand the energy sources available to it, and how energy is used in the state. The CEP provides a succinct picture of energy use in state over a period of time, stating:

> Demand for energy in Vermont is driven largely by the pressures of changes in population and economic growth. Energy demand is also closely tied to the travel patterns of both Vermonters and visitors to the State. Overall energy demand grew by almost 20% between 1990 and 2006. During this 16-year period, real economic growth increased by 55%, population grew by 10%, and transportation vehicle miles traveled (VMT) increased by more than 31%.[6]

In the following sections I will first present a more detailed description of the state's energy supply and energy consumption in order to understand the constraints and needs of state's energy policies.

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[5] Note : This graph was created by author, for use in another published paper.
[6] Note: pdf copy of plan can be retrieved at http://www.vtenergyplan.vermont.gov/

Energy Supply

Vermont is one of only two states in the U.S. that does not produce energy from coal-fired power plants; additionally the state has no fossil fuel resources. Three-fourth of the electricity generated in the state is from nuclear energy, while the remainder is generated from hydroelectric power, biomass, and other renewable sources such as wind and solar. Nevertheless, the state is currently fighting an ongoing legal battle with Entergy, owners of the nuclear power plant, Vermont Yankee (VY), over whether the state has a right to override the NRC's extension of their operating license. Vermont Yankee was commissioned in 1972. Since then, although Vermont pays higher electricity prices on average than the rest of the nation, Vermont electricity prices are in fact the lowest in the New England region. While other states chose to deregulate their electricity industry, Vermont did not, allowing it to maintain a vertically integrated structure of the utilities, regulating generation, transmission, and distribution. This has allowed Vermont to negotiate electric rates directly with its electric utilities, rather than depending on the open power market which is prone to greater price volatility.

VY has provided low cost, reliable electricity to Vermont. Many Vermonters support the state's decision to not extend the nuclear plant's license, which is scheduled to expire in 2012, due to safety concerns and confirmed evidence of tritium leakage into ground water.[7] On the other hand, many Vermonters are concerned that if the nuclear plant were to close, the remaining electricity providers in the state would not be able to meet the demand for electricity at an affordable price. In addition to the potential of losing VY as

[7] http://healthvermont.gov/enviro/rad/yankee/tritium.aspx

an energy supplier, the state's power contract with Hydro-Quebec (HQ) is due to expire in 2016. Together, VY and HQ provide approximately two-thirds of the electricity consumed in Vermont. The uncertainty surrounding the contract negotiations in terms of future electricity prices and supply is an issue Vermont has to contend with.

One unique "supply" in Vermont's energy profile is energy efficiency. Starting in the 1980s State legislation required utilities to practice demand side management and least cost planning. As measures that increase the efficiency of use have proven to be cheaper than energy generation, the procurement of energy savings is treated as a supply substitution. The state's creation of an energy efficiency utility, Efficiency Vermont, now provides energy savings large enough to avoid electric load growth. In other words, energy saved due to Efficiency Vermont's efforts offsets projected electric load growth. On average efficiency has provided Vermont approximately 1% electric savings annually, with the highest percentage of savings, 2.5%, having been achieved in 2008. Cumulatively savings from 2000 to 2010 has been 14%.

The Public Service Board, together with Efficiency Vermont, forecast that efficiency savings will be approximately 2.2% annually for the 2012-2014 budget period. This sustained level of energy savings has enabled Vermont to participate in the ISO-NE Forward Capacity Market, (in which bulk power generators in the New England market bid to provide power at competitive market price) as an energy supplier. As an energy supplier, the EEU's bids its energy savings on the market as if the savings are just like transmitted and distributed energy. Although a given portion of the energy demands are

met through efficiency measures, the market treats these measures as a supply because it fulfill the consumer needs. This is a bold risk for the state's efficiency program because they must guarantee the delivery of their capacity obligations or else incur heavy fines. There are also many benefits to participating in the FCM, the main one being the profits from the market being used to fund efficiency measures for unregulated fuels.

Non-electric energy is a huge part of Vermont's energy profile; it is predominantly used for transportation and building heating. Fossil fuels are the main non-electric energy source and are almost exclusively imported. The most widely used type of this is petroleum, which comprises 54% of all the energy consumed (from all fuel types) in the state. There is no in-state supply of petroleum in Vermont. Biomass, or wood energy, is also widely used for home heating. While Vermont has ample supplies of wood for fuel, it is hard to quantify supply potential, especially because wood as a resource is used for a large range of end-uses, in addition to its inherent value and environmental functions. See Appendix 2 for additional data on Vermont's energy supply.

Energy Consumption

Approximately three-fifths of all homes in Vermont use fuel oil as the primary source for home heating, making petroleum the most widely used energy source. Additionally, because it is a largely rural state, 31% of the all petroleum used in the state is for transportation needs. Natural gas, a cleaner burning fossil fuel than petroleum, is used only minimally throughout the state due to lack of sufficient pipelines in the region. About 5% of the total energy consumed in the state is natural gas, mostly piped from

Canada. There is only one authorized natural gas provider in the state, Vermont Gas Systems, Inc (VGS), which is supplied from the TransCanada Pipeline. Because Liquid Propane (LP) is not a regulated fuel, it is difficult to provide definitive data on its consumption; consumers of LP use it for both cooking and heating. Vermont LP users buy it from both in state and out-of-state suppliers.

Electricity is the second most consumed energy source in the state, generated from nuclear and hydroelectric plants, with peak energy procured from the larger, regional ISO-NE power market. See Figure 3 for chart illustrating energy consumed by fuel type.

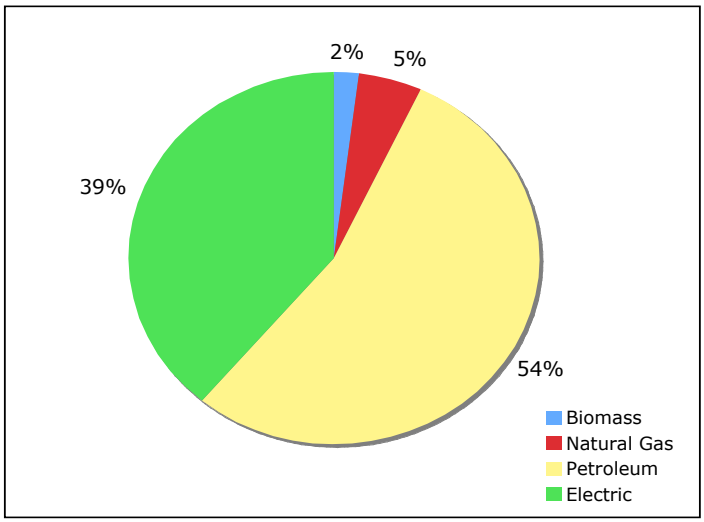

Figure 3: Percentage of energy consumed in Vermont, by fuel type

Total energy demand has continued to grow annually, largely due to population and economic growth in the state. Although Vermont currently consumes less than 0.2% of total US energy demand and has the lowest overall energy consumption of all 50 states, it

still ranks as the 41st highest per capita energy user in the country.[8] Much must still be done to address the state's petroleum based fuel usage. Nevertheless, per capita electricity consumption has declined in the state due to the efforts of the state's energy efficiency utility, Efficiency Vermont. (Refer back to Figure 3).

The use of petroleum for transportation is one of the state's largest demands for energy. The rural nature of the state triggers the need for residents to often drive further than perhaps more densely populated locations need to. Factors that contribute to inefficient petroleum consumption include high usage of single occupancy vehicles with average commuting round-trip distances of 30 miles, and lack of extensive public transportation. In Vermont 31% of "vehicles purchased fall into either the "large" or "largest" vehicle categories, and 41% are designated "medium."" [9] These vehicle sizes correspond to greater fuel consumption but, as a largely agricultural state, it is understandable that there is a need for such. Much of the decisions concerning vehicle fuel efficiency is largely out of the state's control and depends on federal efficiency standards and manufacturer capability/willingness to produce more fuel-efficient vehicles.

Vermont has taken steps to address vehicle fuel efficiency by, for instance, adopting California's Low-Emission Vehicle Program (LEV) standards in 2005. This commits the state to a 30% reduction in average new vehicle greenhouse emission from 2002 levels by 2016. This was not without controversy, however: in 2005 vehicle

[8] See Appendix 1 for comprehensive look at Vermont's Consumption profile.
[9] See http://www.vtenergyplan.vermont.gov/, pg134

manufacturers sued the state claiming that such standards preempted federal standards.[10] In 2007 the court ruled in favor of Vermont and now Vermont has the ability to dictate state emissions levels. It is the hope that higher emissions standards will reduce the fuel consumption for transportation in the state.

Governance of Energy Policies

There are many individual factors that have shaped Vermont's energy policies. The legislative structure and demographics of the state have a major influence on state energy policies. Within the state there are nine cities and 254 towns. The towns govern themselves using guidelines set by state statute and the constitution. At the higher level, the legislative branch is composed of 30 senators and 150 representatives. In 2010 the state population as reported by the US Census was 625, 741. A relatively significant portion of the population (32.9%) in the 25 years and older demographic, has a bachelor's or higher degree, in comparison to the U.S average of 27.5%[11]. According to Thomas Ehrlich, former at both dean of Stanford Law School and president of Indiana University, "educational attainment is a powerful predictor of civic engagement. The more education people have, the more likely it is that they will participate in civic affairs."[12]

It is important to highlight the governance structure of the state in order to illustrate how important civic engagement has been to the state's policies and governance. For example, of the 254 towns, there are 100 active town energy committees. These

[10] http://www.vtd.uscourts.gov/Supporting%20Files/Cases/05cv302.pdf
[11] http://quickfacts.census.gov/qfd/states/50000.html

[12] http://measuringup.highereducation.org/2000/articles/ThomasEhrlich.cfm

committees are comprised of ordinary citizens, whose motivations for involvement ranges from concern for the environment, to protecting consumer interests. These committees are parts of larger networks such as Vermont Energy and Climate Action Network (VECAN) and Vermont Public Interest Research Group (VPRIG), which are often instrumental in bringing energy-related initiatives to the state legislative agenda.

There are two official state agencies that are charged with managing and enforcing energy policies. The first, the Vermont Public Service Board (PSB) is a "quasi-judicial board that supervises the rates, quality of service, and overall financial management of Vermont's public utilities: cable television, electric, gas, telecommunications, water and large wastewater companies."[13] Orders of the PSB are appeal-able to the Vermont Supreme Court. The other is the Vermont Department of Public Service (DPS), which is "an agency within the executive branch of Vermont state government. Its charge is to represent the public interest in matters regarding energy, telecommunications, water and wastewater."[14] Key duties of the DPS include representing the public interest before federal regulatory agencies, state and federal courts, and administering federal energy programs. In addition to the two agencies and the state legislative board, Vermont is required to comply with federal energy policies.

Policy Highlights

[13] http://psb.vermont.gov/

[14] http://publicservice.vermont.gov/about-dps/about-dps.html

The state of Vermont has a reputation for being politically progressive, particularly concerning issues related to the environment. This progressivism has extended to their policies concerning development and energy use. One policy that has had particular influence in shaping energy policy in the state is Act 250[15]. Act 250, also known as the Land Use and Development Act, was passed by the Vermont state legislation in 1970 to manage land use by requiring permits for development. The Act established ten criteria for consideration in land use and development projects. One of the criteria specifically addressed energy usage, requiring that all development projects:

> (9) Conforms with the Capability and Development Plan which includes the following considerations:
> (A) The impact the project will have on the growth of the town or region: (B) Primary agricultural soils; (C) Productive forest soils; (D) Earth resources; (E) Extraction of earth resources; (**F) Energy conservation; (G) Private utility services;** (H) Costs of scattered developments**; (J) Public utility services**; (K) Development affecting public investments; and (L) Rural growth areas.

Act 250 has been fundamental in the shaping of Vermont's energy profile. By expressly requiring developers to ensure that state energy resources can accommodate new developments, Vermont has been able to control and avoid some of the over-development found in other states. Since Act 250 passed in the 1970's, Vermont has steadily and consistently found innovative ways to manage its energy use. Making energy conservation a requirement for development in the state has ensured that issues surrounding energy use have been continually present in state planning.

To further ensure that energy efficiency and conservation measures were being

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[15] http://www.nrb.state.vt.us/lup/publications/nrb1.pdf

implemented in the state, state legislation passed 30 V.S.A. Title 30, Section 202a[16]:

> (1)To assure, to the greatest extent practicable, that Vermont can meet its energy service needs in a manner that is **adequate, reliable, secure** and **sustainable**; that assures **affordability** and encourages the state's **economic vitality**, the **efficient use** of energy resources and **cost effective demand side management**; and that is **environmentally sound**.
>
> (2) To identify and evaluate, on an ongoing basis, resources that will meet state government energy service, infrastructure, purchasing and supply, and fleet needs **in accordance with the principles of least cost integrated planning**; **including efficiency, conservation and load management alternatives**, **purchasing preferences**, **wise use of renewable resources** and **environmentally sound infrastructure development**, energy supply, purchasing practices, and fleet management. (Added 1981, No. 236 (Adj. Sess.), § 4; amended 1983, No. 170 (Adj. Sess.), § 13, eff. April 19, 1984; 1991, No. 259 (Adj. Sess.), § 1.)

The state's requirement of demand-side management and least cost integrated planning to its energy policies further ensured responsible governance of its energy supply. These requirements which we first implemented by the utilities, eventually led to the nation's first independent, energy efficiency utility. Although the efficiency utility primarily deals with electric energy, mainly due to unregulated aspect of other fuel energy, this has been a major, and innovative way for Vermont to address its energy resource issues. As the utility has grown in its impact, scope, and influence, it has started to achieve non-electric savings. Payments to Efficiency Vermont from its participation in the FCM have allowed the EEU to start addressing unregulated fuels efficiency. Additionally, the state participates in the Regional Greenhouse Gas Initiative (RGGI), "the first market-based regulatory program in the United States to reduce greenhouse gas emissions." In 2008, the state legislative board passed Act 92, the Vermont Energy Efficiency and

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16 http://publicservice.vermont.gov/planning/DPS%20White%20Paper%20Feed%20in%20Tariff.pdf

Affordability Act which expressly allowed proceeds from the RGGI initiative to be used to address issues related to home heating with unregulated fuels.[17]

The impact of state energy planners treating efficiency savings as a supply, has both led to the reduction of energy consumption and the stabilization of energy prices. But, equally importantly, it has given economic value to the efficiency as a resource itself. In other words, efficiency savings is treated similarly to distributed energy. Energy saved through efficiency measures is also assigned an economic value. By looking at the use of fossil fuels as not only as an externality to its end use – converting energy for power (electric power for appliances, vehicle fuel for driving, heating and cooling homes, etc), the full cost to the environment can be assessed.

Perhaps the most critical piece in the governance of Vermont energy policies is the public's participation. There are various ways the public has shaped the discourse on energy in Vermont, from involvement in town energy committees to demonstrations concerning VY. Transparency and access to the policy-making process have enabled Vermonters to have greater buy-in and participation in state sponsored energy initiatives. Policy makers have recognized the need for public participation in order to build a foundation for success in policy implementation. Act 208, Vermont Energy Security and Reliability Act explicitly calls for a public engagement process for energy planning.[18] The DPS initiated a Mediated Modeling project in order to facilitate communication

[17] See: http://www.leg.state.vt.us/docs/legdoc.cfm?URL=/docs/2008/acts/ACT092.HTM

[18] See http://www.leg.state.vt.us/docs/legdoc.cfm?URL=/docs/2006/acts/ACT208.HTM

between energy planning committees, utilities and the general public. "Mediated Modeling combines consensus based meeting facilitation with computer modeling as an approach to understanding environmental and economic issues and to support decisions about them" (http://publicservice.vermont.gov/planning/mediatedmodeling.html).

In a report prepared by the Snelling Center for Government, entitled "Engaging Citizens in Vermont's energy Future," the authors present this theory of public engagement:

> There are three primary rationales for why citizens should be engaged in policy planning: instrumental, normative and substantive. The instrumental rationale argues that participation improves the efficiency of decision-making. By involving the public, projects have more community support, are more representative of community values and have a better chance of being implemented. The normative rationale looks at participation as essential to a healthy democracy. Involving citizens in decisions that affect them is the right thing to do. The substantive rationale argues that the "best" decisions come through public participation. The public brings information and knowledge to the process that will produce superior decisions.[19]

The governance structure within the state has allowed the state's energy planners to not only have targets (expectations), but also granted them the power to implement policies such as demand side management and least cost planning. These two policy requirements have paved the way for increased support of renewable energy technologies and funding mechanisms. Vermont's policy stance regarding renewable energy is robust and widely supported by the public. In addition to renewable energy being environmentally less damaging, the state is seeking to be more energy independent. There

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[19] See http://www.snellingcenter.org/filemanager/filedownload/phpyipE7U/EnagagingCitizensinVermontsEnergyFuture.pdf

is also the hope that renewable energy can support in-state economic growth through green jobs.

Vermont actively promotes renewable energy generation and consumption through a variety of policies. In 2005 the state enacted Act 74[20], which allowed VY above ground dry cask storage of radioactive waste. In return VY and the state signed a Memoranda of Understanding establishing the Vermont Clean Energy Development Fund (CEDF). The CEDF was to promote the development of cost effective, sustainable, and renewable electric resources. From 2005 the CEDF has collected $4-7 million annually and are expected to last through 2012. Proceeds from the fund are used to fund the Vermont Small-Scale Renewable Energy Incentive Program, which provides incentives for "qualifying solar electric, solar hot water, small wind systems, and micro-hydro systems."[21] The American Recovery and Reinvestment Act bolstered the fund in 2010 with an additional $5.2 million. The CEDF also administers a loan program, which provides low, 2.0% interest loans for approved renewable projects.

(See Appendix 3 for a Comprehensive list of Vermont incentives for renewable Energy.)

IV. Analysis and Discussion

This study has been carried out under the premise that governance has played a critical role in the evolution of energy policies in Vermont. To further analyze the role governance has had in terms of Vermont's energy policies, it is important to take a further look at what governance is. In Speth and Haas governance is defined as follows:

[20] http://publicservice.vermont.gov/index/CEDF%20Report%207_06.pdf
[21] Vermont Small-Scale Renewable Energy Incentive Program

> Governance is the sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken. It includes formal regimes empowered to enforce compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be in their interest…[governance] is not [government]…The concept of governance is thus broad: it includes governmental actions but also includes other processes, formal and informal, that communities employ to decide what is in their common interest, and how to act collectively (2006, pg.3).

This definition of governance stresses the relationships between individuals and groups, and how these relationships shape action, compliance and results. In the case of energy policies, I believe that it is the cooperative relationships, inclusiveness, transparency and civic engagement, between state legislation, and the utilities that have allowed Vermont to become one of the most energy efficient states, currently ranked at number 5 in the US by ACEEE[22]. It is important to remember that energy policies are important not just because they define the types of the energy that we use, how much we use, or at what cost. Energy policies are important because of their impact on human lives and the environment. Because of the direct impact of energy policies on individuals and the planet, Vermont's inclusive governance structure has been beneficial to the achievement of policy goals.

However, for all of Vermont's success creating a climate of inclusiveness when endeavoring to create transparent energy policies, there is much room for improvement. I observed during my work and research that often the most involved members of the public and citizen advocacy groups shared similar characteristics. Merely from informal observations and conversations, most public participants have been engaged in matters

[22] http://www.aceee.org/energy-efficiency-sector/state-policy/vermont/217/all/191

concerning energy and /or the environment for many years. They are generally well informed and often are well educated or have technical backgrounds. More disturbingly, there seems to be a divide along socio-economic and political/ideological lines between active supporters of progressive energy policies and passive (or even non-) supporters. In order for public engagement in the energy planning processes to have the highest impact, diverse views and opinions must be taken into consideration.

The public engagement process must include all sectors of society, especially because often the ones who are left out, often acutely experience the burden of high energy prices and other challenges in accessing appropriate or sufficient energy supplies. It is important for those at the highest levels of the decision-making process ensure that the public engagement process accounts for the needs of all Vermonters. One way to work towards this is framing the process in terms that help people to understand that energy policies have immediate and personal impacts to everyone's life.

Funding for the EEU, which is generated from a systems benefit charge from all electricity customer bills, is one topic that has split public opinion. Many see it as a financial burden. However, in addition to up-market benefits and avoided cost savings to the utilities, which are passed on the public in the form of stable electric rates, the EEU offers many direct, financial incentives to Vermonters. These incentives range from financial rebates for energy efficient appliances, to loans and grants for home energy retrofits. The segments of society that are against the systems benefits charge can be

converted into allies for this state program if the message can be framed to show the benefits of the EEU to all Vermonters.

While governance has played an important role in the shaping of the state's energy policies, it is important to return to, and discuss how the state's energy supply and consumption are critical to the constraints and shaping of these policies. As stated before, petroleum is the most widely used energy source in Vermont. However, the economic and environment cost of petroleum use is burdensome to the state. The oil embargo of the 1970s provided critical awareness of why dependence on fossil fuels is problematic to the state, and the rest of the nation. Despite the obvious shortfalls that reliance on fossil fuels present for the state, Vermont has not done enough to wean itself from this energy source.

Much effort has been expended to address electricity efficiency, and while electric efficiency policies are tremendously important, enough has not been done to address Vermont's dependency on fossil fuels. I would go further to say that it has been almost critically neglected. The old and energy inefficient housing stock of the state relies so heavily on fossil fuels for heating and yet little has been done to address this. According to the US Department of Energy (DOE), 60 percent of Vermont homes use fuel oil for heating.[23] While the Residential Building Energy Standards (RBES) were passed by state legislation in 1997, they are largely not enforced. Building energy inspections are not required and further, the RBES includes a list of exemptions that encompass a large

[23] http://apps1.eere.energy.gov/states/residential.cfm/state=VT

percentage of the housing stock in the state. One of the most shocking exemptions from the RBES are homes built before 1998. As of 2009, most figures place at least 70 percent of homes in Vermont being built before *1978*.

While the state's push for more renewable energy generation and use is admirable, it will not do enough to address, in my opinion, the larger issue of fossil fuel dependency in the state, largely influenced by the home heating needs. Unless more work is done to address the condition of the housing stock and its accompanying heating needs, the overall energy policies of the state will continue to maintain a glaring gap. Policies should go further to address the realities of the current housing stock and their energy needs.

V. Conclusion

Environmental management is vital to global sustainability. Vermont's management and governance of its energy policies offers valuable insights, and practical examples of what can be done to work towards a more secure and sustainable future. This case study has highlighted how good governance must be a critical part of any effort to address environmental management. A defined system of goal sharing and goal making, coupled with encouragement for public engagement, foster greater chances for accountability, sustainability, and success for Vermont's energy policies.

Much of the policies implemented in Vermont have been beneficial in managing the state's energy use. The ability and willingness of policy makers to create and work with

the various stakeholders, including the general public, the utilities, civil society organizations, and state agencies, speaks to the commitment to influence positive change. Analysis of the state's efforts shows that when focused and sustained attention is given to environmental management, positive change can be affected. The cumulatively 14% electricity savings from 2000 to 2009 from efficiency measures by the state's efficiency program is great evidence of that.

The foundation laid by Act 250 in 1970 has paved the way and facilitated conversations surrounding responsible development and energy use. Other policies such as the Vermont Energy Security and Reliability Act, which requirements a public engagement process, and the state's willingness to constantly revisit specific policies has improved its ability to design an energy management system that works. Further, Vermont has embedded into its governance structure, the ability to react to changing technological innovations available, and changing national and international policies and guidelines. By constantly revisiting its policies, adjusting and creating funding structures to address its energy needs, and enforcing accountable standards, Vermont can provide good examples of ways that good governance is vital to energy management.

Going forward, I would suggest that Vermont policy-makers and other stakeholders work more carefully towards addressing its comprehensive energy needs. It is important that the state recognize just how dependent it is on fossil fuel energy that expensive and damaging to the environment. The political and economic climate surrounding the world's oil supply places Vermont in a precarious and volatile position in meeting its

total energy needs. Vermont should continue its current efforts in energy management, while further expanding its reach and focus to ensure a truly sustainable energy future.

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Vermont Small-Scale Renewable Energy Incentive Program
http://www.aceee.org/energy-efficiency-sector/state-policy/vermont/217/all/191
http://apps1.eere.energy.gov/states/residential.cfm/state=VT

Appendix 1
Energy Supply Vermont

Reserves	Vermont	Share of U.S.	Period
Crude Oil	—	—	2009
Dry Natural Gas	—	—	2009
Natural Gas Plant Liquids	—	—	2008
Recoverable Coal at Producing Mines	—	—	2009
Rotary Rigs & Wells	**Vermont**	**Share of U.S.**	**Period**
Rotary Rigs in Operation	0	0.0 %	2009
Crude Oil Producing Wells	0	0.0 %	2009
Natural Gas Producing Wells	—	—	2009
Production	**Vermont**	**Share of U.S.**	**Period**
Total Energy	83 trillion Btu	0.1 %	2009
Crude Oil	—	—	2010
Natural Gas - Marketed	—	—	2009
Coal	—	—	2009
Capacity	**Vermont**	**Share of U.S.**	**Period**
Crude Oil Refinery Capacity (as of Jan. 1)	—	—	2011
Electric Power Industry Net Summer Capability	1,126 MW	0.1 %	2009
Net Electricity Generation	**Vermont**	**Share of U.S.**	**Period**
Total Net Electricity Generation	584 thousand MWh	0.2 %	Jun-11
Petroleum-Fired	NM	NA	Jun-11
Natural Gas-Fired	*	NA	Jun-11
Coal-Fired	—	—	Jun-11
Nuclear	442 thousand MWh	0.7 %	Jun-11
Hydroelectric	108 thousand MWh	0.3 %	Jun-11

Other Renewables	33 thousand MWh	0.2 %	Jun-11
Stocks	**Vermont**	**Share of U.S.**	**Period**
Motor Gasoline (Excludes Pipelines)	20 thousand barrels	0.1 %	Jun-11
Distillate Fuel Oil (Excludes Pipelines)	41 thousand barrels	0.0 %	Jun-11
Natural Gas in Underground Storage	—	—	Jun-11
Petroleum Stocks at Electric Power Producers	W	W	Jun-11
Coal Stocks at Electric Power Producers	W	W	Jun-11
Production Facilities	**Vermont**		
Major Coal Mines	None		
Petroleum Refineries	None		
Major Non-Nuclear Electricity Generating Plants	J C McNeil (City of Burlington-Electric) • Berlin 5 (Green Mountain Power Corp) • Bellows Falls (TransCanada Hydro Northeast Inc.,) • Sheffield Wind (Vermont Wind LLC) • Wilder (TransCanada Hydro Northeast Inc.,)		
Nuclear Power Plants			

Appendix 2

Energy Consumption: Vermont[24]

Per Capita	**Vermont**	**U.S. Rank**	**Period**
Total Energy	249 million Btu	42	2008
By Source	**Vermont**	**Share of U.S.**	**Period**
Total Energy	154 trillion Btu	0.2%	2008
Total Petroleum	16.3 million barrels	0.2 %	2009
» Motor Gasoline	8.0 million barrels	0.2 %	2009
» Distillate Fuel	4.9 million barrels	0.4 %	2009
» Liquefied Petroleum Gases	2.4 million barrels	0.3 %	2009
» Jet Fuel	0.5 million barrels	0.1 %	2009
Natural Gas	8,637 million cu ft	0.0 %	2009
Coal	—	—	2009
By End-Use Sector	**Vermont**	**Share of U.S.**	**Period**
Residential	43,972 billion Btu	0.2 %	2008
Commercial	31,663 billion Btu	0.2 %	2008
Industrial	26,816 billion Btu	0.1 %	2008
Transportation	51,983 billion Btu	0.2 %	2008
For Electricity Generation	**Vermont**	**Share of U.S.**	**Period**
Petroleum	NM	NA	Feb-11
Natural Gas	4 million cu ft	0.0 %	Feb-11
Coal	—	—	Feb-11
For Home Heating (share of households)	**Vermont**	**U.S. Avg.**	**Period**
Natural Gas	12 %	51.2 %	2000
Fuel Oil	59 %	9.0 %	2000
Electricity	5 %	30.3 %	2000
Liquefied Petroleum Gases	14 %	6.5 %	2000
Other/None	10 %	1.8 %	2000

[24] http://www.eia.gov/state/state-energy-profiles-data.cfm?sid=VT

Appendix 3: Financial Incentives

Corporate Tax Credit
- Business Tax Credit for Solar

Local Loan Program
- New Generation Energy - Community Food Service Efficiency Lending Program
- New Generation Energy - Community Solar Lending Program

PACE Financing
- Local Option - Property Assessed Clean Energy

Performance-Based Incentive
- CVPS - Biomass Electricity Production Incentive
- Green Mountain Power - Solar GMP
- Vermont Standard Offer for Qualifying SPEED Resources

Property Tax Incentive
- Local Option - Property Tax Exemption

Sales Tax Incentive
- Renewable Energy Systems Sales Tax Exemption

State Loan Program
- Clean Energy Development Fund (CEDF) Loan Program
- Vermont Economic Development Authority and Efficiency Vermont - Business Energy Conservation Loan Program

State Rebate Program
- Efficiency Vermont - Agricultural Lighting Rebate Program
- Efficiency Vermont - Commercial Lighting and LED Lighting Incentives
- Efficiency Vermont - Compressed Air Systems
- Efficiency Vermont - Home Performance with ENERGY STAR (Existing Residential)
- Efficiency Vermont - HVAC Equipment Rebate Program
- Efficiency Vermont - Incentives for Integrated Design and High Efficiency Equipment
- Efficiency Vermont - Multifamily Apartment Rebate Program
- Efficiency Vermont - newLIGHT Incentive Program
- Efficiency Vermont - Small Commercial Refrigeration Incentive
- Efficiency Vermont - Vermont ENERGY STAR Homes (New Construction)
- Vermont Small-Scale Renewable Energy Incentive Program

Utility Grant Program
- CVPS - Biomass Grants

Utility Loan Program
- Vermont Gas - Residential Energy Efficiency Loan and Rebate Program

Utility Rebate Program
- Burlington Electric Department - Commercial Energy Efficiency Rebate Program
- Burlington Electric Department - Multi-Family Rental Energy Efficiency Rebate Program
- Burlington Electric Department - Residential Energy Efficiency Rebate Program
- Vermont Gas - Commercial Energy Efficiency Program

Vermont Gas - Residential Energy Efficiency Program