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Kearsarge Valley Transition Initiative Energy Descent Action Plan Template

Building a Resilient Community: A Framework

Author

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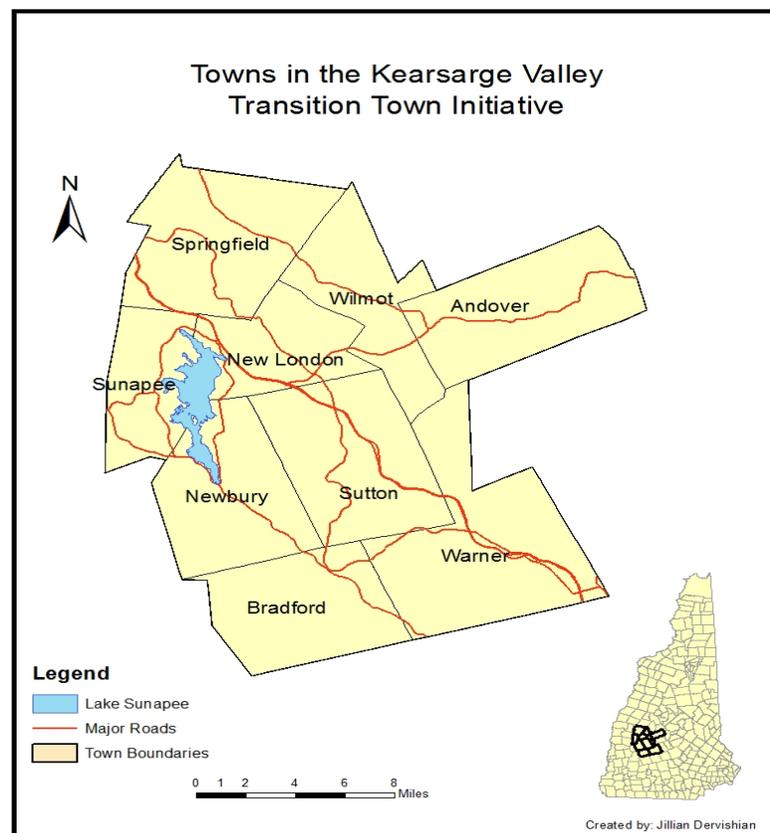
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Executive Summary

This semester members of the Environmental Science and Studies Community Based Research Project have worked to develop a frame work for an Energy Descent Action Plan for the Kearsarge Valley area in conjunction with the Kearsarge Valley Transition Initiative. The Kearsarge Valley Area is defined as the towns that make up the Kearsarge Valley: New London, Bradford, Newbury, Sutton, Springfield, Warner and Wilmot plus the towns of Andover and Sunapee.



An Energy Descent Action Plan (EDAP) is a guide toward lower energy consumption in preparation for challenges we will face in the future such as economic insecurities, environmental instabilities, and our reliance on non-renewable energy. There are many different aspects of a community that can be applied to this EDAP in order to reduce our energy footprint and increase our overall resilience. These areas include the local economy, the residential sector, education, food, health, waste, tourism, and of course energy itself. Finding a way to reduce the amount of energy our community uses is essential to meeting the challenges that we face now and in the future: such as peak oil, climate change, and our global economy. By creating a positive vision for our community we will become more resilient. This report will look to outline the reasons for an EDAP and the ways in which it can be implemented in the Kearsarge Valley area. We will look at the areas listed above and how they affect the energy consumption of our community. We will outline some vulnerabilities that each area has in terms of energy dependence and ways in which we can increase our resilience by decreasing our energy consumption and finding local solutions to the global issues we face today.

The Kearsarge Transition Initiative

The Kearsarge Valley Transition Initiative is an emerging local network of individuals, businesses and organizations that are committed to improving the well-being and resilience of our neighborhoods and communities now and into the future. Drawing upon the ideas, skills and experiences of our members we develop positive localized solutions to address the regional impacts of larger global issues such as economic insecurity, environmental instabilities, and dependence on non-renewable energy. The Kearsarge Valley area is blessed with breath-taking beauty, deeply enthusiastic people and unique family-owned businesses, and our intent is to leverage the strength of those elements to help foster our shared values of love, food, family,

health, security, engagement and connections throughout the region. We aim to improve the quality of life in a variety of categories through communal empowerment, strengthening of relationships, utilizing local resources, and building local resilience.

Goals

Recommendation: These are some suggestions of goals for creating an EDAP. This section could be expanded upon or deleted. I do suggest that you keep it because it is another way to emphasize what the purpose of creating this document.

The Kearsarge Valley has several goals in mind when creating and implementing this Energy Descent Action Plan.

- Building a stronger more resilient community.
- Finding practical local based solutions to the larger global issues that we face.
- Identifying and strengthening the vulnerabilities our community will face in an energy constraint world.
- Creating a positive vision for the future.

Background

There are many reasons why implementing an Energy Descent Action Plan will help to increase the quality of life of our community. By developing and implementing an EDAP in our community we will increase our resilience to outside shocks caused by environmental instability, economic insecurities and energy uncertainties caused by our dependence on non-renewable energy. It is important to understand issues such as peak oil, climate change and economic crisis

as we move forward, for each one presents us with different challenges that we need to overcome as a community in order to create a stronger more resilient Kearsarge Valley Area.

The Age of Oil

List of everyday items we use that are oil based

**Anesthetics--aspirin--balloons--ballpoint--pens--cameras--candles--car battery--clothes--
crayons--deodorant--eyeglasses--fertilizers--insect repellent--lipstick--nail polish--
perfumes--roller skates--rubbing alcohol--safety glasses--shampoo--shaving cream--soap--
sun glasses--surf boards--sweaters--tennis rackets—tires—toothbrushes--toothpaste**

Oil has been a remarkably useful resource. It has allowed us to advance our society in a way that would have been impossible without it. Oil has allowed us to build cities, make the world smaller by creating faster travel. It has allowed us to create everything from plastic to medicine. Oil has allowed us to explore and learn about the very world we live in.

If one takes a reasonable and responsible look at the benefits oil has provided us, they will get a better understanding of why we are so dependent on oil. Oil has proven time and time again to be the most reliable and versatile energy we have discovered. Oil is in every aspect of our lives. It could be seen as the very foundation of society. Oil, however, is a finite resource.

One of the challenges that we face today is our dependence on oil. Not only is it damaging to the environment by contributing to climate change, it also heavily affects our economy, and again is a finite resource. We need to change; we need to reduce our energy consumption while implementing new energies so we can create a more resilient future.

Peak Oil

As stated above oil is one of the most important components of our modern civilization. It is what powers our society and provides us with the many materials that we rely and depend on. We live on a finite planet and many of the resources that we consume are limited, and oil is no exception. The United States is the number one consumer of oil in the world, according to the U.S Energy Information Administration (EIA). In 2011 the United States used 18.83 million barrels of oil a day. The next largest consumer of oil was China using 8.29 million barrels a day. Not only are we the number one consumer of oil we consume two times more than the next country; a country that has about four times as many people. We need large quantities of oil because we use seemingly endless amount of energy in this country. A report done by the Energy Information Administration (EIA) in 2012 said that the United States used 71.161 Quadrillion BTUs during the course of the year. Just to put that into perspective that means in 2012 alone we used over 20.8 trillion kilowatt hours of energy and energy demand continues to rise each year. “In fact, in its International Energy Outlook 2009, the Energy Information Administration (EIA) projects that world energy demand will grow by nearly 45 percent between 2006 and 2030, with about a fifth of a new supply needing to come from oil,” (Graefe, 2009). Again oil is a non-renewable resource and yet we treat it like it is eternal. It takes hundreds of millions of years for oil to form. We will not be alive long enough to see the creation of new oil reserves on our planet. Peak oil follows this logic by stating that because oil is a finite resource there is a time at which the maximum, or peak, of oil production occurs. In other words peak oil is not when we run out of oil; it is the point in time when the global production of oil will reach its maximum rate, after which production of oil will decline, (Figure 1.0).

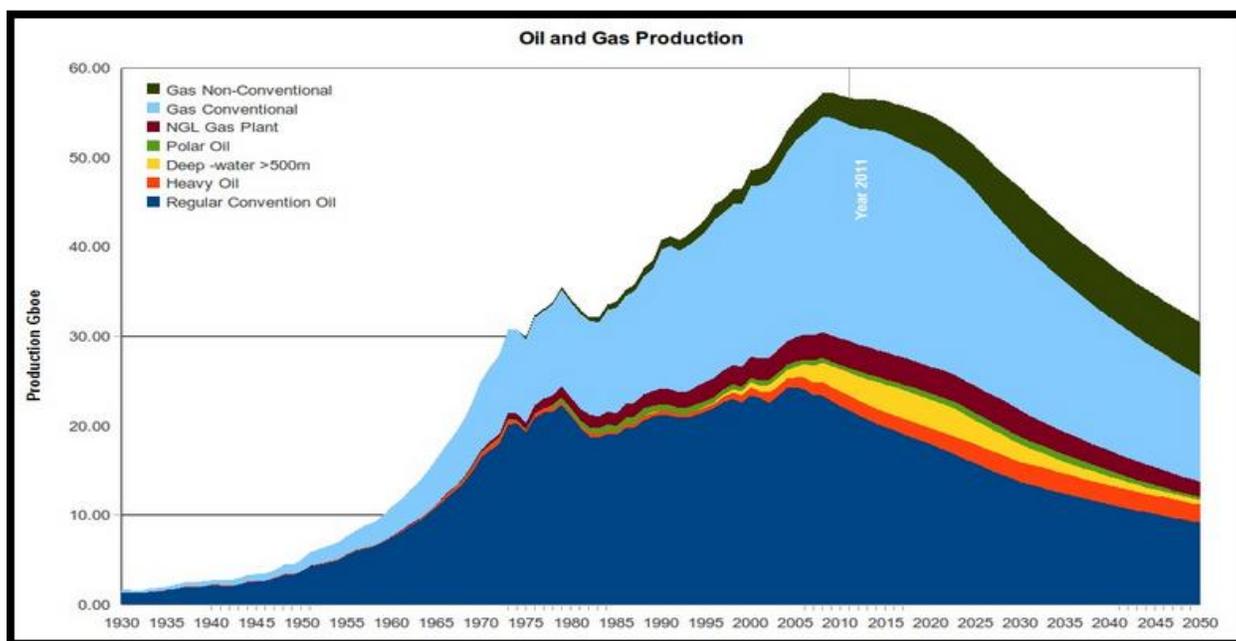


Figure 1.0

This graph shows the oil and gas production from 1930 to 2012 and the projections up to 2050
<http://peakoil.com/what-is-peak-oil>

If peak oil is when we reach the maximum production of all oil reserves not when we run out of oil, why is it such a big problem? Our infrastructure, economy, and way of life are so highly dependent on oil any change in the supply of oil will have a tremendous effect on these systems. Oil is used in many aspects of our lives. From the development of countless items we use every day from plastic bags to automobiles our industry depends on oil. Our global economy is also built on the foundation of oil, the United States is the second largest exporter of goods and the largest importer of goods in the world, (United States, 2013). All these items that we export and import need to be transported by ship, plane, and trucks. In other words vehicles that use petroleum (oil) based fuels like gasoline and diesel. When the supply of oil starts to decrease while the demand continues to grow prices will increase dramatically. It is simple economics. This is the reason why we need to be prepared for the peak of oil production so that we can find ways to mitigate or completely escape the major effects peak oil will have on our lives.

We can use indicators to help us to determine if we are nearing the peak of oil and one of these indicators is economics. We have already seen increases in the price of oil skyrocket. According to the Energy Information Administration (EIA) “average crude oil prices in 2012 were at historically high levels for the second year in a row. Brent crude oil averaged \$111.67 per barrel, slightly above the 2011 average of \$111.26,” (EIA). This is something that has not gone unnoticed by the public. We have all felt the impact of rising gas prices at the pump. These increases in price are not an anomaly however, it is simple economics. As demand for oil increases and the supply for oil decrease the price goes up. Oil prices will only continue to climb as fast as we consume the product, as shown in figure 1.1. This will have major effects on our economic system especially due to that fact that our trade system and economy as a whole are completely dependent on energy.

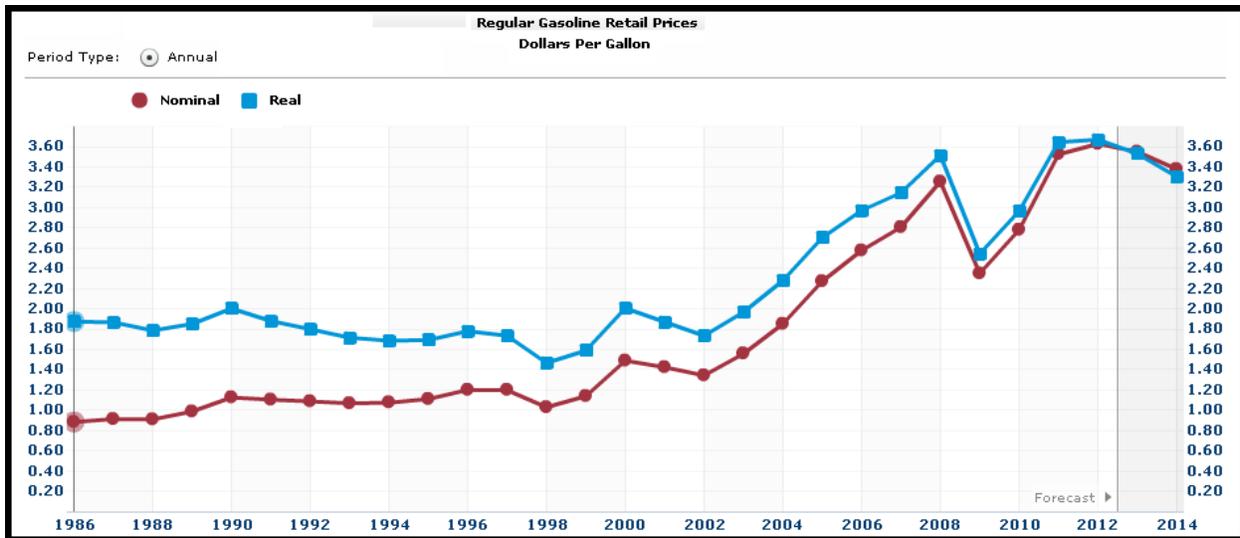


Figure 1.1

Graph from the Energy Information Administration showing regular annual gasoline retail price over time
Nominal is prices fixed over time while real is prices adjusted for inflation

<http://www.eia.gov/forecasts/steo/realprices/>

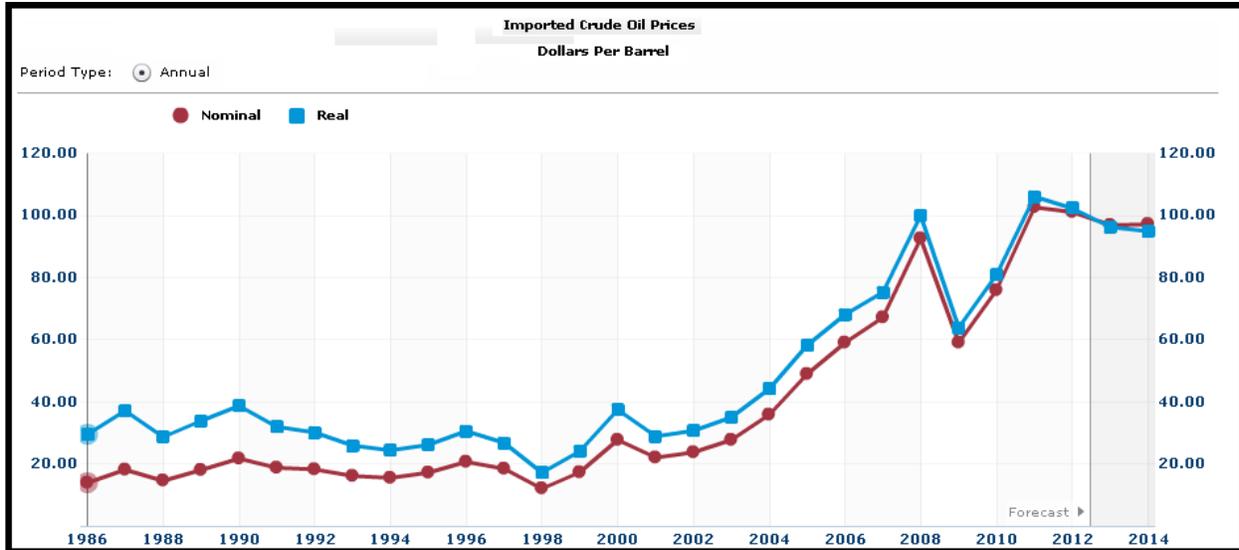


Figure 1.2

Graph from the Energy Information Administration showing the imported crude oil prices over time

<http://www.eia.gov/forecasts/steo/realprices/>

Another indicator that we can use to determine if we are nearing the peak is the uncertainty of the oil companies themselves. In November of 2006 a meeting took place in Colorado Springs. This meeting, called the Hedberg Research Conference on Understanding World Oil Resource, brought together oil companies from around the world as well as organizations such as the U.S. Geological Survey, Energy Information Administration and the International Energy Agency. The purpose of this conference was to estimate the amount of reserves left in terms of oil. Before the conference the USGS had put forward a figure of 650bn barrels yet to be discovered, but the conference put the figure at just 250bn,” (Ron Hopkins pg 15). Oil companies are seeing a dramatic drop in there oil reserves (Figure 1.3), and have had to resort to merging with other companies. Oil companies have also had to find new avenues for finding and drilling oil. Energy source such as tar sands, oil shale, and heavy oil are now being pursued where in the past they were not economically viable options. As the supply of oil decrease there will be an increase in oil related conflict. In fact conflicts over oil have already occurred as evident with the United States war with Iraq. "Of course it's about oil; we can't really

deny that," said Gen. John Abizaid, former head of U.S. Central Command and Military Operations in Iraq, in 2007, (Juhasz, 2013). Before the war in Iraq, Iraqi oil was nationalized with some of the largest oil reserves in the world. After years of fighting that oil is now dominated by private oil companies such as ExxonMobil, Chevron, BP, and Shell, (Juhasz, 2013). The United States is only one of the largest consumers of oil in the world it is also one of the greatest military powers the world has ever seen. We sometimes use this power to guard our own interests and one of our greatest interests is oil because it is integral to our economy or industry our culture, and our way of life. Former Federal Reserve Chairman Alan Greenspan agreed, writing in his memoir, "I am saddened that it is politically inconvenient to acknowledge what everyone knows: the Iraq war is largely about oil." Then-Sen. and now Defense Secretary Chuck Hagel said the same in 2007: "People say we're not fighting for oil. Of course we are," (Juhasz, 2013).

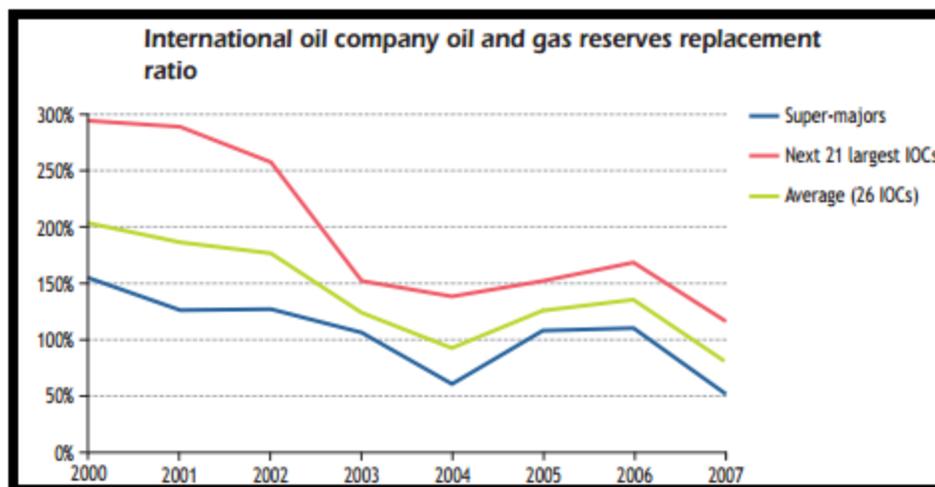


Figure 1.3

Report done by the International Energy Agency
World Energy Outlook 2008 page 346

<http://www.iea.org/media/weowebiste/2008-1994/WEO2008.pdf>

Of course there are a lot of other variables that affect these indicators and so they can sometimes be misinterpreted. There is much speculation on when peak oil will occur for this reason. One problem we have in determining when peak oil will occur is that we do not know for certain how much oil is still yet to be discovered. First of all many of these estimates are based off of our current ability of extracting oil. This would include the existing technology that we use to extract and refine oil today. We have no idea what technological advances we will have in the future. Perhaps there will be some sort of technology that will allow us to locate more oil, or extract oil from areas that were previously not economically feasible. On the other hand if there is some sort of future technology that will allow us to find and extract more oil, that process would most likely yield an energy source with a lower energy return (the amount of energy that is put into the process of extracting and refining the source of energy e.g. oil, and the amount of energy that the source provides). Another problem in determining how much oil there is left is caused by a lack of accurate information about current oil reserves. Countries are under no legal obligation to share that information with the rest of the world so we can only estimate how much oil we currently have. “According to the EIA in 2007, 88 percent of the world’s proven reserves were owned by government-controlled oil companies--with over three-quarters of those reserves located in OPEC (Organization of the Petroleum Exporting Countries) countries — which are not subjected to external auditing,” (Graefe, 2009). These large oil exporting countries benefit from this uncertainty because they have more control over the price of oil. All these uncertainties about global oil reserves and the future of technology make it impossible to accurately predict peak oil. This inability has led some to believe that peak oil is just a myth. In fact some point to the fact that oil production continues to increase even today. Remember, however, oil is a finite resource. There is only a limited supply and at some point in

the future we will reach the maximum production of oil at which time oil production will start to decrease. The only sure piece of information that we have about peak oil is that it will happen. Again oil is a finite resource and if we continue to use it as we have in the past and as the EIA projects we will in the future, we will reach a maximum production of oil at which time the production will decrease. The inevitability of peak oil is unquestionable. If we take practical steps now to prepare for peak oil, we will be resilient enough to overcome the challenges when that time ultimately comes.

We can do this... Cuba did

We are so reliant on non-renewable sources of energy like oil that it is difficult to imagine a future where we were able to overcome the challenges of peak oil. There are examples, however, where societies were able to overcome the challenges in an energy constrained world. Cuba is perhaps the best example of a country that was able to survive “peak oil.” In this case Cuba experienced their own “peak oil” caused by the fall of the Soviet Union who had provided Cuba with more than 50 percent of their oil imports, much of its food and 85 percent of its trade economy, (Quinn, 2006). In the face of such odds Cubans were able to create a resilient community. In order to survive this newly energy constrained world they had to find local solutions such as small local farming, small scale renewable energy, and a reduction in energy intensive transportation (e.g. cars, busses, etc). Many of the solution that the Cubans were able to implement were out of necessity because of the major loss in energy and support that they experienced. We have an opportunity to make these local changes now before we experience a major shock in energy production so that when that time does come we will be prepared. We can use the resources we have at our disposal now so that we can create a stronger more resilient and sustainable community.

Other Current Energy Sources

Although oil is a major contributor to the energy that we consume, it is not the only fossil fuel that we use to power our infrastructure and way of life. Below is a brief introduction to other fuel sources, such as coal and natural gas as well as other more energy intensive oil extraction methods that are used today and some reasons why they are not a substitute for oil.

Other Oily Prospects

Tar sands and shale oil are starting to play a larger role in the modern energy picture. These types of oil were once never thought of as practical energy sources due to their relatively low energy return. In other words the energy return on energy invested was too low. The fact that these kinds of oil are now being pursued is another indicator that peak oil is something that we will have to deal with in the near future. It seems that if these sources are even being considered, the end of cheap, easy oil is over, or at least so close that it is within the oil companies interest to start looking at alternatives.

Tar sands have to undergo an intensive process, due to its makeup, before it can be used. Tar sands are comprised of clay, sand, water, and a heavy viscous oil, (U.S. Department of the Interior, 2012). This process is what has made tar sands an impractical energy option in the past. Once the tar sands are extracted from the earth the oil from the tar sands is separated using a combination of hot water and movement. The oil then floats to the top and is collected. You can think of it as using a giant washing machine but instead of washing clothes you are washing sand to get oil. The ration of tar sand to oil is quite high. In fact it takes about two tons of tar sands to get one barrel of oil, (U.S. Department of the Interior, 2012). This source of oil will never be a

practical alternative to drilling easy oil because of the intensity of the process that is used, and again tar sands are a non-renewable resource.

Shale oil is another type of oil that has, in the past, been impractical. It has been used to a small degree in the past due to its ability to be burned like coal, but it has never reached a level of use or extraction like conventional oil. Essentially, shale oil is rock that contains a small amount of oil and although its formation process is similar to coal, it does not experience pressures or temperatures high enough that are required for coal to form. There is a process that can be done in order to separate the oil from the shale itself using extreme heat. This is an intensive process that consumes money, time and resource. Similar to tar sands, shale oil will never be able to produce as much energy as conventional oil and as a result is not a particle energy alternative.

Coal and Natural Gas

Coal and natural gas are another part of the energy picture and yet surprisingly do not get as much attention as oil. It is important however to talk about these other two sources of energy. “Petroleum accounts for approximately 37% of the world’s energy consumption. Coal and natural gas together supply approximately 48%, (Little & Match, 2009). Just like oil, coal was formed over hundreds of millions of years, and just like oil it is a finite resource. According to the National Energy Information Administration, the United States have such large reserves of coal it is estimated that there is enough to last us for another 200 years. This begs the question, why do we have to worry about peak oil if we have so much coal? Although the United States holds the world’s largest supply of coal, about 90% of this coal is mainly used for the production of electricity, (EIA). Coal has very low versatility when it comes to its uses. It is not a good

source of fuel for vehicles, due to the expensive process it has to undergo, and it has little use when it comes to creating many of the items that we take for granted that are petroleum (oil) based. This estimate of 200 years' worth of coal is also an estimate of when our reserves will last not when "peak coal" will occur. When the total production of coal reaches its peak and then starts to decline prices will increase. Again it is simple economics when the supply of coal starts to decline while the demand for coal stays at a high level, prices goes up. Thomas Edison once said, "We shall make electricity so cheap only the rich will burn candles," yet with such high demand for energy, there will be a time in the future when only the rich can use electricity.

Natural gas is yet another fossil fuel that takes millions of years to form. Natural gas has many different applications similar to oil. It can be used for many residential applications such as heating and cooking fuel; it can be used commercially, in industry, and is even used in the application of many different products such as fertilizer. "Of the natural gas consumed in the United States in 2011, about 95% was produced domestically; thus, the supply of natural gas is not as dependent on foreign producers as is the supply of crude oil, and the delivery system is less subject to interruption," (U.S. Energy Information Administration, 2012). Natural gas is a very versatile fuel source and burns cleaner than oil or coal but just like any other non-renewable energy, there is only so much of it before it reaches its peak. When it does reach its peak it will have the same effect on the economy as peak oil.

Each of these fuel sources has a peak of production and once that peak is reached it will affect us negatively. We cannot just think in terms of peak oil, or peak coal, or peak natural gas, but instead we have to think of peak energy in general. When we rely on so many different energy sources that are non-renewable and will be exhausted at some point it has an effect on our society by making us very un-resilient. Instead of replacing non-renewable energy sources with

another non-renewable energy source and only extending the inevitable, let us take the time now with the resources we have to solve the problem. This point of resilience will be brought up later because it is a very important point when it comes to an energy descent action plan.

Just imagine for a moment that we lived in a society that was not influenced by the economy and resilience was not an issue, and fossil fuels were everlasting, there would still be another reason why the use of fossil fuels like oil, coal, and natural gas is not a viable option for the future. That reason is climate change.

Climate Change

Climate change is a major global issue that we face today. Anthropogenic (human) pollution has altered a vital function of the atmosphere, the greenhouse effect. When solar radiation hits the earth some of that heat is absorbed by the land, water etc, while most of it is re-radiated back toward space. Gases in our atmosphere like carbon dioxide and methane act like a blanket and capture that re-radiated heat before it can escape into space, (figure 2.0).

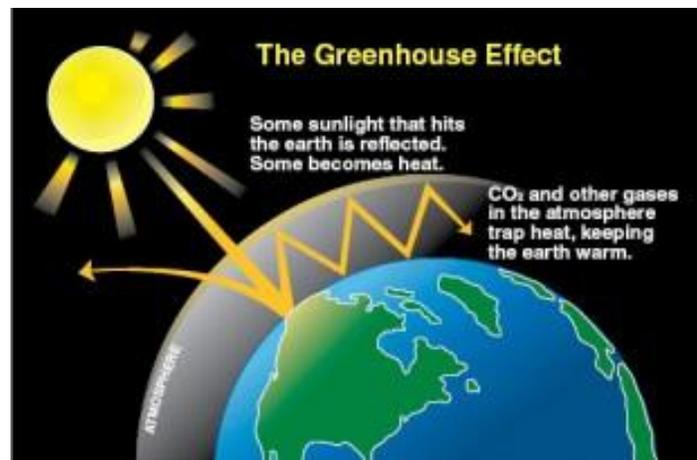


Figure 2.0

Picture from [ClimateCommission.gov](http://climatecommission.gov.au/causes/greenhouse-effect/) showing the Greenhouse Effect
<http://climatecommission.gov.au/causes/greenhouse-effect/>

The greenhouse effect is one of the reasons that life is possible on Earth. Mars, for example, has a thin atmosphere so its greenhouse effect is not as strong as Earth's. As a result the temperatures on Mars can range from -125 to 23 degrees F, (Harvey & Burdick, 2012). The greenhouse effect plays an important role in the climate of the planet. When the levels of greenhouse gases rise or fall the ability of the greenhouse effect to retain heat from the sun changes accordingly.

Scientists have determined that an increase in the level of carbon dioxide, a greenhouse gas, in our atmosphere has caused the change in climate that we are currently experiencing. This increase in carbon dioxide has effectively increased the ability of the greenhouse effect to retain heat from the sun, causing global climate change, (EPA, 2013).

The science on climate change has become incontrovertible in the past decade. Climate science is built upon data that stretches back billions of years. The history of the Earth's climate is trapped in rock formations, ocean and lake sediments, as well as in ice formations. This history shows a world with a dynamic climate system that in the past has fluctuated between warm (tropical) and cold (glacial) climates. These changes in Earth's climate have been occurring well before humans existed and were driven by natural forces. The data extracted from the rocks, sediments and ice cores have formed our understanding of the interactions between key components of our Earth namely, solar radiation, ocean currents, volcanic activity and greenhouse gases. Changes in any of these components have direct impacts on Earth's climate. An example of this would be a decrease in solar radiation as Earth's orbit elongates – one of the three cycles (Milankovitch cycles, Figure 2.0) that affect the amount of incoming solar radiation. This decrease in solar input is a decrease in energy reaching Earth, less energy translates into decreases in temperature. Another example of this is the change in atmospheric greenhouse gas concentrations such as CO₂. It has been written in our history that when CO₂ increases

temperatures increase. Stretching back 420,000+ years prior to the industrial revolution CO₂ concentrations have fluctuated between 170 parts per million (ppm) and 270 ppm, (Petit, 1999). Concentrations near 170 ppm were “ice ages” or glaciations, while concentrations near 270 ppm are warmer periods or inter-glaciations.

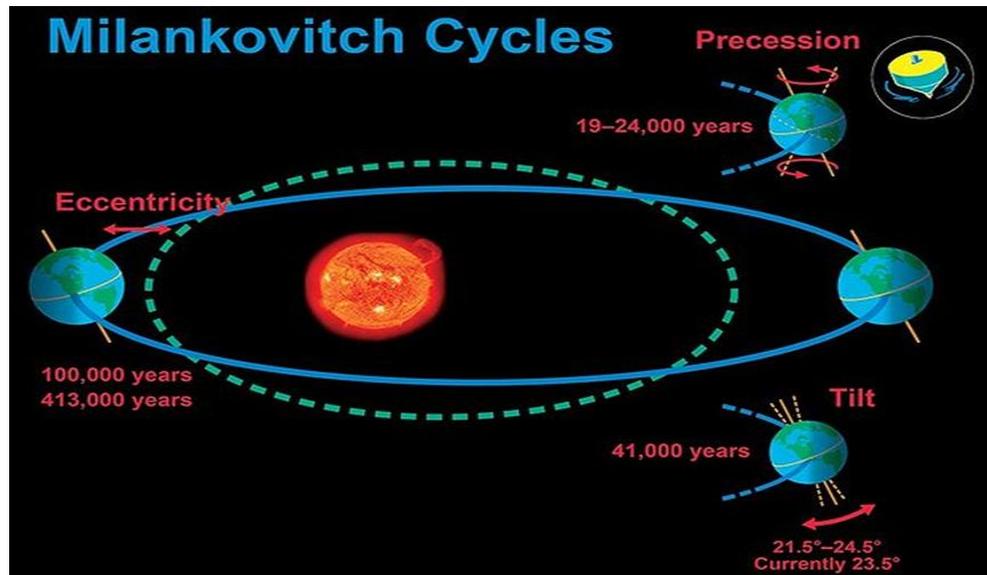


Figure 2.0

Diagram from the Encyclopedia of Earth

http://www.eoearth.org/article/Milankovitch_cycles

There is a difference between changes in climate of the past and the current climate change we are currently experiencing. Scientific models are used to understand how different factors impact the climate in different ways. Natural factors that impact the climate, as stated above, include increases in the solar radiation from the sun, increase in carbon dioxide and other greenhouse gases from volcanic activities, and changes ocean currents. Anthropogenic or human driven factors affecting climate would mainly include the burning of fossil fuels like oil, natural gas and coal. In order to create these models scientists use many different types of data so that they can accurately interpret how these different factors affect the climate of our planet. This data would include levels of different greenhouse gases, the relation of the Earth to the sun, and

human activities such as fossil fuel use. Scientists are then able to model what kind of temperatures we would be experiencing if, for example, only natural factors were influencing the climate. They could also model what the temperature would be if anthropogenic factors were the only variables affecting the current climate. Scientists can then compare the temperatures of a climate caused by natural factors and one that is caused by anthropogenic factors to the actually observed temperature changes that we are experiencing today. By themselves natural factors cannot explain the temperature change that we are currently experiencing. When the natural factors are combined with anthropogenic (human) factors, the model temperatures and the observed temperatures are very similar, (Figure 2.1). From these models it is easy to see how human activity could be the culprit to the present day climate change.

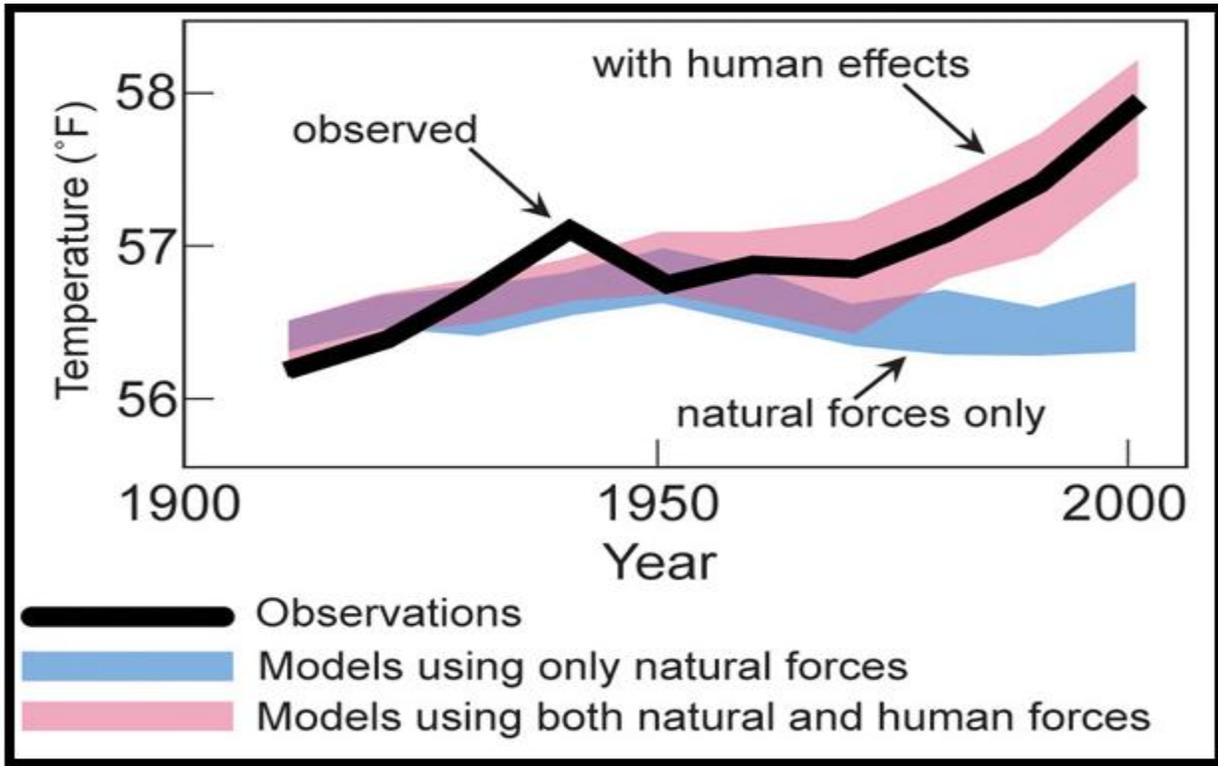


Figure 2.1
Graph Form Environmental Protection Agency
<http://www.epa.gov/climatechange/science/causes.html>

Models are not the only way we can determine what factors are influencing the current change in climate. By learning about the past climate cycles the Earth has experienced we can get a better understanding on how climate is influenced. We can then apply this knowledge to modern day factors that impact climate. Carbon dioxide is a greenhouse gas, and is also a by-product of burning fossil fuels. The more fossil fuels we consume the more carbon dioxide is released into the atmosphere increase the ability of the greenhouse effect to capture heat radiation from the sun. “Atmospheric concentration of carbon dioxide has risen from 315 ppm in the 1950’s to 388 ppm in 2010,” (Dow, 2011). This increase in carbon dioxide is in a direct correlation with the increase in temperatures we are experiencing worldwide. But again there have been climate cycles of the past so if we look purely at the data and ignore the models, how do we know this is not just another natural cycle? Currently, since the onset of the industrial revolution CO₂ concentrations have risen near 400 ppm, a concentration that has not occurred for over 800,000 years (Dow, 2011). This is not just a coincidence there is a connection between human use of fossil fuels and the increase in greenhouse gasses. Fossil fuels are used to power almost every aspect of our lives from electric production to the food that we grow. According to the Environmental Protection Agency electric production is the largest contributor to greenhouse gasses. Over 70% of our electric production comes from burning fossil fuels mostly coal and natural gas. Transportation is the second largest contributor of greenhouse gas emissions and about 90% of the energy used to transport materials and people comes from the use of fossil fuels mostly oil based energy such as gasoline and diesel. Industry that creates all the materials and items that we use every day is the third greatest contributor to greenhouse gas emissions. Commercial and residential use of energy also contributes to the increase in greenhouse gas emissions. Agriculture, which includes the production and upkeep of crops and livestock also

contribute to this increase in emissions of our atmosphere. There are areas that help to reduce the influx of greenhouse gas emission. Forest are perhaps the best example. Trees take in carbon dioxide in the atmosphere and create oxygen as a byproduct. Unfortunately this offset of greenhouse gases accounts for such a small fraction of the overall picture. In fact in 2010 land use and forestry accounted for only a 15% offset in greenhouse gas emissions, (EPA 2013). Electric production, industry, transportation, residential and commercial use of energy, and agriculture are the essential pieces that make up our everyday lives, yet each piece contributes to the overall problem of climate change, (Figure 2.2).

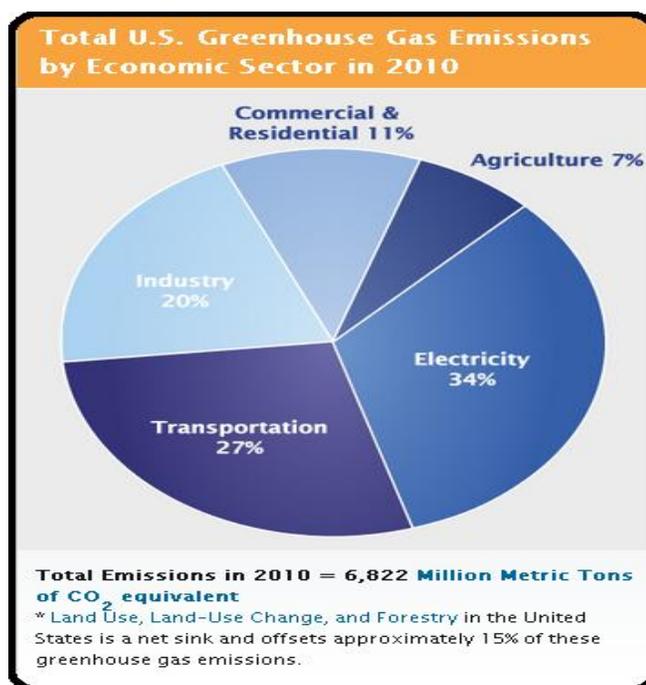


Figure 2.2

Graph from the Environmental Protection Agency: Sources of Greenhouse Gas Emissions
<http://www.epa.gov/climatechange/ghgemissions/sources.html>

If we continue to use energy as we do today we will only add to the current climate crisis. The world will not be able to adapt to the ever increasing levels of greenhouse gases that we are adding to the atmosphere.

So who cares if the climate is warming? The Earth has experienced changes in climate in the past, so does it really make that much of a difference? The biggest concern that we have is that due to the influence humans have on the current warming of the planet the change in climate will happen too fast for anyone or anything to adapt to it. Human societies are set up in a particular way and the model that we use is not particularly resilient. There are two ways to think of this when answering those questions. One, a warming of the planet will negatively affect many different ecosystems and organisms on our planet, including humans, as shown in figure 2.3.

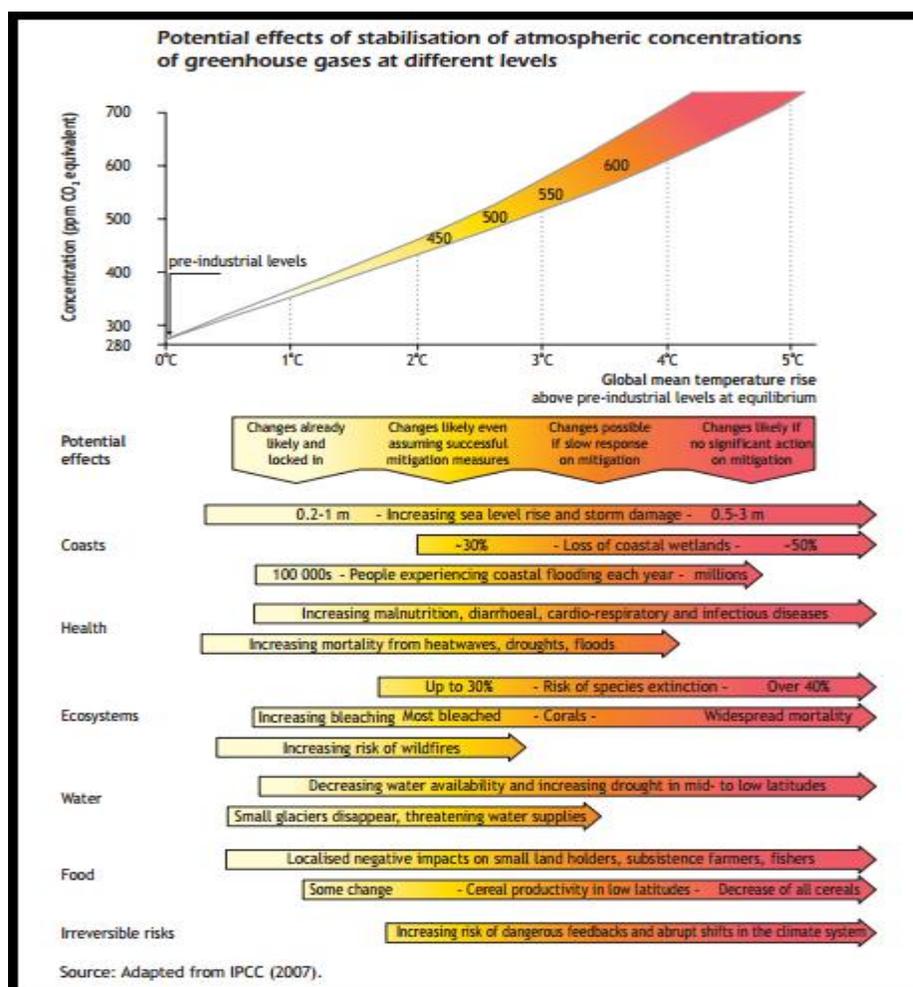


Figure 2.3

Report done by the International Energy Agency
World Energy Outlook 2008 (Page 412)

<http://www.iea.org/media/weowebiste/2008-1994/WEO2008.pdf>

Two, a warming of the planet can affect our economy and our very way of life. “The changing climate impacts society and ecosystems in a broad variety of ways. For example climate change can increase or decrease rainfall, influence agricultural crop yields, affect human health, cause changes to forests and other ecosystems, or even impact our energy supply,” (Climate Change Impacts and Adapting to Change, 2012). (To learn about the effects climate change will have on our society followed this link to the United States Environmental Protection Agency website: <http://www.epa.gov/climatechange/impacts-adaptation/>). Our economy has already been weakened by the recession of 2008. This is the third global issue that we face today, economic insecurity.

Economic Insecurities

Recommendation: We need to talk with the business department and get some students to help out with the economics section. This is an important part and should not be overlooked. This is a great way to get people to understand how an EDAP will impact them in a positive way. I think that the business students could do a lot better job at writing up an introduction of why the economy is important, how were we affected by the recession of 2008, what is the model of economies in this country and the world, and is there a more resilient model that we can look at (e.g. focused on more local economies rather than global economies). The ENV and business students have to work together on this. The Endless growth model does not work on a finite planet.

Resilience

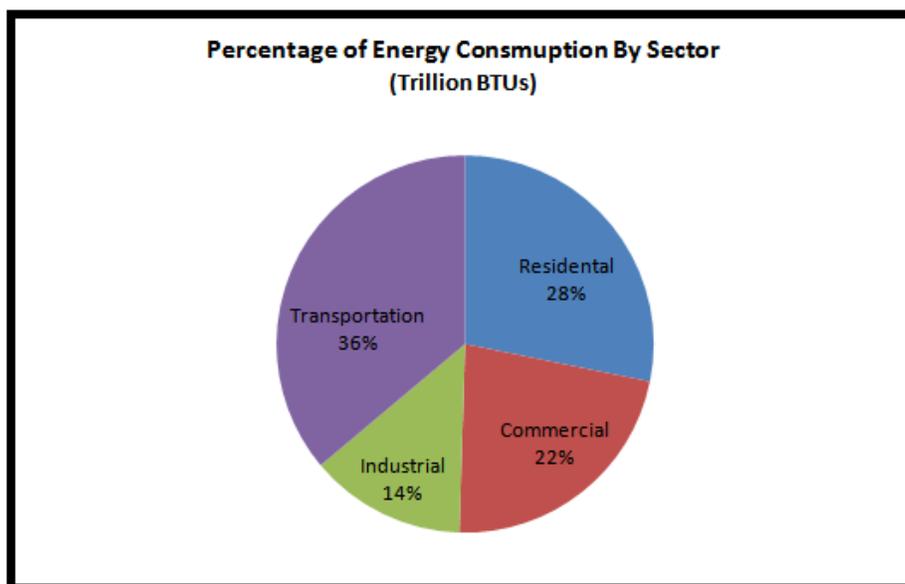
Resilience is the ability of a person or community to adapt to or absorb outside shocks to the system. Resilience is an important component to any community and one that is many times overlooked. Unfortunately because of the way our societies are set up there is little too no resilience in our communities today. In the past we have been negatively affected by many different disruptions in our system. The fuel crisis of the 1970s and the recession of 2008 are two examples of shocks to the system that we were not able to cope well with. One of the reasons

that we are so inflexible is many of the materials that we use and the energy we depend on comes from all over the world. In fact in 2012 the United States was the largest importer in the world with an estimated \$2.4 trillion worth of imports in the same year (United States, 2013). This is something that is relatively new. In past generations communities were more self-sufficient. They were able to supply themselves with basic necessities like food and basic materials. One of the best examples of this was the United Kingdom during World War II. Cut off from important resources because of the war they had to find a way to become resilient, and provide for themselves. One example of this self-reliance is illustrated by this piece from the book The Transition Handbook by Rob Hopkins, “By 1944 the amount of land under cultivation had increased from 12.9 million acres in 1939 to 19.8 million, food production had risen 91% and in effect Britain was able to feed itself for approximately 160 days a year rather than the 120 days it had been in 1939”. This shows that it has been done before. We can build more resilient communities, and although we are not facing an invasion like Britain at the time, we still face difficult challenges in the near future. It is vital that we become more resilient in light of the challenges that we will face such as economic insecurities, environmental instabilities and our dependence on non-renewable resources. These issues that we have discussed above will continue to impact our society in the future. We have two choices. We can either do nothing now to improve our resilience and wait for these issues become so great that we must face them at a time when we will have already felt the impacts, or we can plan now and create a more resilient community that will be able to overcome the obstacles that we will inevitably face. We must examine where our community currently stands in terms of resilience, we need to identify the important components of our community we need to identify the vulnerabilities of our community so that we can create the steps we need to improve the resilience of our community.

New Hampshire

Now that we have covered some of the basics such as peak oil, climate change, and economic insecurity on a national scale it is now time to focus on New Hampshire.

Peak oil will affect New Hampshire just like it will affect the country at large. In 2010 New Hampshire used 33.8 trillion BTUs worth of coal, 62.6 trillion BTUs worth of natural gas and 249.3 trillion BTUs worth of petroleum (oil), (U.S. Information Administration, 2010).



Data from: (U.S. Information Administration, 2010)
http://www.eia.gov/state/seds/sep_sum/html/pdf/sum_btu_1.pdf

According to the Department of Energy, New Hampshire is ranked 44th in energy consumption (1 being the most consumed and 51 being the least consumed), with 229 million BTUs consumed per person in 2009. When it comes to the amount of money that we spend on energy New Hampshire ranks 23rd (1 being the most money spent and 51 being the least money spent), with about \$3,706.28 per person spent in 2009. This means that although this state does not consume as much as other states in terms of energy we do spend a lot more. There is of course different factors that affect the price of energy, transportation, types of energy consumed, etc. This means

that when peak oil does occur New Hampshire will be affected more acutely because we already pay more per person on energy than the majority of states. We need to start thinking about how we can mitigate the effects peak oil could have on our state.

Although New Hampshire consumes less than most other states there is still concern about energy consumption and the effect its use has on the climate. New Hampshire is a state that is looking to reduce their emissions to combat global climate change in order to protect local interests. Each region of the country will be affected by climate change in different ways. The picture below from the Environmental Protection Agency shows what New Hampshire temperatures will be like if the current climate change will continue. It shows that by 2099 temperature in New Hampshire will be more like temperatures in Virginia and South Carolina today.

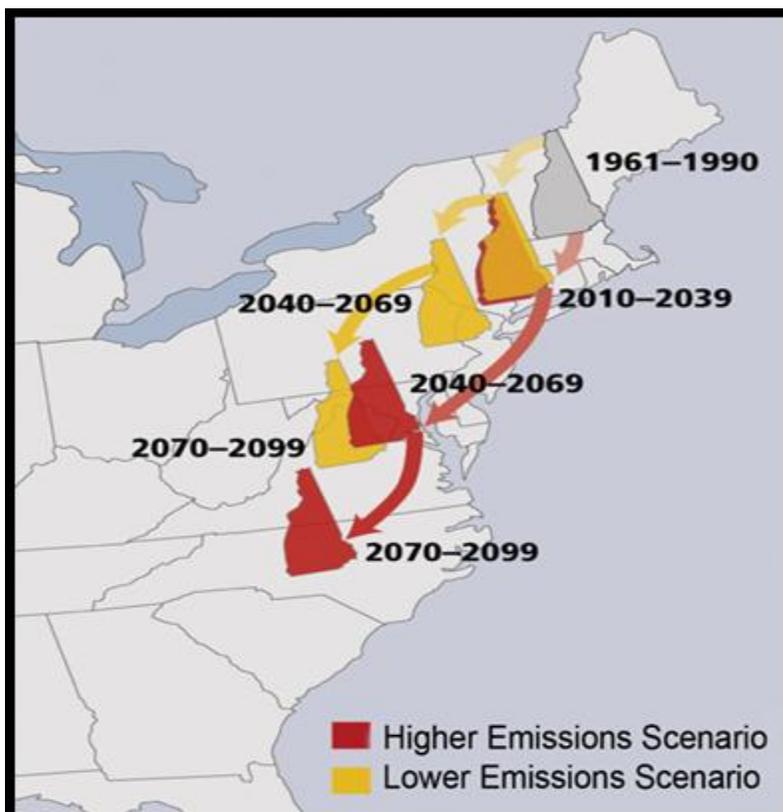


Figure 3.0

Picture from the Environmental Protection Agency

<http://www.epa.gov/climatechange/impacts-adaptation/northeast.html>

This change in climate will have many impacts to the state itself and perhaps one of the most conspicuous of these impacts will be to the state's economy. There are certain industries in New Hampshire that depend on the climate of this region such as maple sugaring and skiing. When temperatures increase due to climate change these industries could be severely crippled or even eliminated affecting the economy of the state. Skiing, for example, is a \$650 million annually industry, and a \$3 billion annual industry in the North East region. If temperatures were to increase as shown in figure 3.0 then skiing will no longer be viable economic driver in New Hampshire. This will have detrimental impacts to the state's economy as a whole. The government of New Hampshire understands the importance of reducing our impact on global warming. [The New Hampshire Climate Action Plan](#) created in 2009, begins to look at the state's energy usage in order to reduce our emissions and create a more resilient state economy in the face of global issues such as climate change. This plan is similar to an Energy Descent Action plan in that it looks for ways to create a more resilient community, in this case the state, so that we can be better prepared for the future. It is different in that the driving force for the plan is preparing for climate change itself rather than other issues such as peak oil and economic insecurities. This Climate Action Plan still has many of the principles that an EDAP would have. One of the goals of this Climate Action Plan is to reduce the states carbon emission by increase the energy efficiency of the state, and finding alternative, renewable energy sources, in an attempt to combat the current climate change.

In order to overcome the many challenges that we face in the near future such as climate change, peak oil, and economic insecurities, not only do we need action at the state level but we also need action at the local level. Each community has its own dynamics and each community is

just as reliant on energy, climate, and the economy as the next. Each community should make itself more resilient to the challenges that we face so that we can have a positive future for ourselves and for our children.

The Kearsarge Valley Area

Now that we have discussed the many issue that we face today, where we currently are in terms of energy in our county and state, and the importance of resilience we have to start to examine at our own community, and create the positive vision that we would like to see in the future of this area. Again the area that we are looking at is all the towns that make up the Kearsarge Valley, New London, Bradford, Newbury, Sutton, Springfield, Warner, and Wilmot plus the towns of Andover and Sunapee. The many different components of our community have been broken up so that their importance, vulnerabilities in an energy constraint world, can be better identified and understood. We must remember that these different sectors are made up by people and the individual people of the communities are the ones that need that make the change we desire in this community.

Residential

*Recommendation: This section still needs work. It is very difficult to get energy consumption by town or even county. So far I have had little luck in obtaining this information from energy providers such as PSNH and oil providers such as Rymes etc. I think it is worth trying to contact them again in order to see if there is a way that this information can be provided. There is no specific provider for each town. Make sure they understand that you are looking for their customers' energy usage. There may be privacy issues but assure them that you only need the energy usage data and not private information. If that does not work ask if they can provide this information if you get their customers to sign an agreement. **THIS HAS TO BE DONE EARLY IN THE SEMESTER BECAUSE IT WILL TAKE TIME!!!!!!!!!!!!!!!!!!!!** I also suggest that you contact some of the members of the transition group. They may have experience in this matter and will be able to assist you. Contacting each town might help. For example it was suggested to me that contacting the planning board of each town could provide me with this information. It might come down to using a survey to get an understanding of energy usage in*

the residential sector of each town. AGAIN DO THIS EARLY IT WILL TAKE TIME!!! Make sure that you work with the energy committees/groups (New London, Andover). They can help you help them.

Why is it important

What does it look like now?

The residential sector of most of the towns in the Kearsarge Valley area are set up with more houses near a main business district or street in the town with the number of houses decreasing as you move farther from the Main Street or downtown area. Some of the towns do not have a downtown area and those communities are more spread and out. Many of the houses are large and some are on big plots of land that are either landscaped or left in more of a natural state. There aren't many apartment style or condominium communities. The population of the area has been increasing since the 1970s. The annual population growth rate for the area is approximately 1.7%. According to 2011 census data the total population of the Kearsarge Valley area that we are defining is about 16,982 people. The total number of housing units in the Kearsarge area is 9,803, ((ELMI), 2012). Now picture the energy bill that you pay each month and multiply that by 9,803. Not only is this a very large bill that has to be paid, money that is going out of our local economy each month, but it is also quite a bit of energy that is being used by just this small area.

Town	2011 Population	Total Housing Units
Andover	2373	1124
Bradford	1651	831
New London	4399	2316
Newbury	2074	1504
Springfield	1303	583
Sunapee	3343	2509
Sutton	1839	936
Warner	2836	1375
Wilmot	1358	668
Total	16982	9803

<http://www.nhes.nh.gov/elmi/products/cp/index.htm>
Collection of data from each of the community profiles

According to Clinton Hutchins, Member Solution/Marketing Manager of NH electric CO-OP, residential customers use on average 550 kilowatt-hours per month which cost about \$95 per month. This is an average of 6,600 kilowatt hours a year for each resident costing \$1,140 a year on electricity alone.

The Vision

This section needs to be done BY the community members. Remember that this vision is for THEIR community. It will mean a lot more if it comes from residents who have lived here for a long time rather than college students who will live in this community for less than four years. This could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section.

Vulnerabilities

MORE STATS ARE NEEDED IN THIS SECTION

- *On average how much energy do people in this area use?*
- *How many people actually have renewable energy?*
- *Where does most of this energy come from?*

The residential sector relies heavily on oil and other fossil fuels. Houses rely on electricity, generated mostly from coal, as well as and oil, for heat. Many people haven't implemented the use of alternative and renewable resources and for those who have they still cannot support themselves fully on the renewable energy. One concern is the aesthetic appeal of the community and many feel that the implementation of solar panels and other renewable devices will take away from that appeal. Convincing the members of the community that such devices can make the community more appealing will be important for people to accept the changes proposed. Some may also feel like affordable housing may detract from the appeal of the area, but it is important to keep a strong sense of community and openness when being a part of a transition town.

Steps to Resilience

*This section needs to be done with the help of the community. This means that they need to have a good idea of the goals of this section and the overall EDAP. Find people who are knowledgeable in this area. REMEMBER THESE STEPS HAVE TO BE **PRACTICAL** Again this could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section. These steps are suggestions and can be changed if necessary.*

Short Term (1-5 years)

- Energy audits on houses throughout the Kearsarge Valley communities.
- Plans for affordable housing communities or complexes. Possibly start of construction.
- Existing homes begin implementing permaculture gardens and renewable energy sources such as solar.
- Get town governments involved and in support of renewable resources and affordable housing, in the form of tax or rebate incentives

Medium Term (5-15 years)

Long Term (15-30 years)

Local Economy

Recommendation: This section needs a lot more work. Again we need to get some business students to help out with the EDAP and this would be a great section for them to work on. We need people to understand why a local economy would benefit them and how it creates resilience to larger economic failures while reducing our impact on the environment and our dependence on non-renewable energy. We also need people who can work with local business to develop this section so that it is as practical as possible. Make connections with local businessmen who have started to create a sustainable business. Start by contacting Tom Mills. This is a very important section because a lot of people are much more concerned about the economy than they are about energy or the environment. If we are able to connect the economy to the environment and energy

and illustrate what could happen in a future with peak oil and climate change it could help to explain the importance of this EDAP.

Why is it important

Just like at the national and global level the economy is an important aspect of any community. Having a strong local economy is a vital component of a community's resilience. There are many benefits to having a strong local economy. The most obvious one is that money spent locally stays local. As any economist would say an economy's health is a ratio between the injections and leakages of spending into the circular flow of income, (Schiller, Hill, & Wall, 2012). To put it another way there is a constant circulation of money that, although it changes hands, theoretically does not leave the community. We can think of a local economy as a bucket full of holes. Each time money is spent outside of the local area, in large "one stop shops" that money flows right out of the bucket through one of the holes. If we were to strengthen the local economy we would be reducing the amount of holes in the bucket and allowing money to circulate in the community. Another benefit of having a local economy is the ability to reduce our energy consumption. As previously stated transportation is a major contributor to carbon dioxide emissions because it is highly energy intensive. Items that are not bought locally need to be shipped. There are also many items that are made in many other countries around the world that then need to be transported to the United States before they can be shipped to their respective buyers. Remember the United States is the second largest exporter of goods and the largest importer of goods in the world, (United States, 2013). When energy prices begin to rise due to peak energy transportation will become a lot more expensive. Having a localized economy will help our community stay resilient to this outside shock that will be experienced to peak energy.

What does it look like?

In the Kearsarge Valley there are still many small local stores that make up the local economy of this region. This area does have a relatively low unemployment rate, with the unemployment rate for the Kearsarge Valley area being around 4.7%, ((ELMI), 2012). This shows that our local area is somewhat resilient to outside economic crisis because our unemployment rate is below the national rate of about 7.7%.

Town	Labor Force	Employed	Unemployed	Unemployment Rate (percent)
Andover	1326	1264	62	4.7
Bradford	947	902	45	4.8
New London	1847	1757	90	4.9
Newbury	1165	1122	43	3.7
Springfield	844	814	30	3.6
Sunapee	1578	1507	71	4.5
Sutton	1017	976	41	4
Warner	1487	1407	80	5.4
Wilmot	710	684	26	3.7
Total	8724	8342	382	4.6

<http://www.nhes.nh.gov/elmi/products/cp/index.htm>
Collection of data from each of the community profiles

Although we are fortunate to have such a low unemployment rate that does not mean that we have a strong local economy. Many of these jobs are not in Kearsarge area. This means that people have to drive, sometimes over a long distance, in order to get to their job. And again transportation can be one of the biggest contributors to energy consumption. One of the biggest factors that creating a strong local economy are where the money we earn is spent. In other words we can go back to the analogy of the local economy as a bucket full of holes. When we spend money are we spending it in local stores or are we spending in large retail stores who essentially take a lot of that money out of our local economy. In the Kearsarge Valley area we are fortunate enough not to have a lot of these large retail stores like Wal-Mart. However there

are many stores in towns like Sunapee, Newbury, and New London that rely on summer tourists to get much of their income. We need to make sure that small business owners do not have to rely on seasonal customers to make a living. We need to buy locally to support our local stores and strengthen our local economy.

The Vision

Recommendation: This section needs to be done BY the community members. Remember that this vision is for THEIR community. It will mean a lot more if it comes from residents who have lived here for a long time rather than college students who will live in this community for less than four years. This could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section.

Vulnerabilities

There are two main vulnerabilities that we face in terms of the local economy. One is the incursion of larger retail stores that could rid our community of small family run businesses. This does not seem to be something that is too likely since we still have many small family run businesses in this area today. The other vulnerability is our local economies reliance on non-renewable energy. In order to power the many business that are around here and transport the many supplies and materials that we use, we need energy. When we do hit peak oil we will have a harder time supplying ourselves with the materials that we need. Our economy will be severely weakened. We need to make sure that we are not so reliant on energy in the future.

Steps to Resilience

*Recommendation: This section needs to be done with the help of the community. This means that they need to have a good idea of the goals of this section and the overall EDAP. Find people who are knowledgeable in this area. REMEMBER THESE STEPS HAVE TO BE **PRACTICAL**. Again this could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section. These steps are suggestions and can be changed if necessary.*

Short Term (1-5 years)

- Educate the public on the importance of a local economy
- Educate business owners on ways to become more energy sufficient
 - Have ways for business owners to talk to others that have a more sustainable business already
- Have a majority of business owners agree to a reduction of energy usage by 2030

Medium Term (5-15 years)**Long Term (15-30)****Schools Education**

Recommendation: There needs to be a little bit more work done in this section. We have data on energy consumption for some of these schools. We need to make sure that we also get information on the schools that are not part of the Kearsarge Valley District. I recommend that you contact those schools directly. They should have that kind of data on hand.

Why is it important

Schools and education are a corner stone of our community. It provides our children with the knowledge they need to succeed later in life. It is a time for both growth and development of ideas and individuals. Our children are the future and the education they receive is and should be the most important thing. Knowledge is our greatest resource and we need to make sure that our schools reflect the values that our community shares.

What does it look like?

School Name	Type	Town	Address	Zip
Colby-Sawyer College	Liberal Arts College	New London	541 Main St	03257
Kearsarge Regional Elementary	Public K-5	New London	64 Cougar St	03257
Andover Elementary	Public K-8	Andover	20 School St	03216
Proctor Academy	Private	Andover	PO Box 500 Main St	03216
Kearsarge Regional Middle	Public 6-8	Sutton	32 Gile Pond Rd	03260
Kearsarge Regional High	Public 9-12	Sutton	North Rd	03260
Sutton Central Elementary	Public K-5	Sutton	Newbury Rd	03221
Simonds Elementary	Public K-5	Warner	Church St	03278
Kearsarge Regional Elementary	Public K-5	Bradford	Old Warner Rd	03221
Nfi North Bradford School	Private 7-11	Bradford	2552 Route 103	03221
Sunapee Central	Public K-5	Sunapee	22 School St	03782
Sunapee Middle High	Public 6-8	Sunapee	10 North Rd	03782
Sunapee Senior high	Public 9-12	Sunapee	10 North Rd	06782
Mount Royal Academy	Private K-12	Sunapee	26 Seven Hearths Ln	03782
College of St. Mary Magdalen	Private Catholic College	Warner	211 Kearsarge Mountain Rd.	03278

Table of School in the Kearsarge area

The school systems within the surrounding communities currently follow the model that most other schools in the United States operate under. When looking at the New Hampshire Department of Education curriculums, there is no mention of energy reduction or sustainability being taught (New Hampshire Department of Education, 2012). To date, the majority of the

schools are reliant on electricity generated from power companies that service the Kearsarge Valley area and the surrounding towns. According to Larry Leboeuf, business manager for the Kearsarge Valley school district, the district used an average of 2,730,111 kilowatts of electricity in the 2011-2012 fiscal year. With an average cost of \$0.1333 a kilowatt this a total cost of about \$363,923.80. This means that in a five year period the district spends over 1.8 million dollars on electric power alone, and that assuming that energy prices stay the same. Furthermore the school district used about 89,878 gallons of fuel during the 2011-2012 fiscal year. With an average of \$3.125 per gallon this is a total cost of \$280,868.75 annually. This means that over the school year the district spends more than half a million dollars on energy annually. Over a period of five years the district spends about 3 million dollars on energy. This is a lot of money that could be used to find alternative renewable energy as well as the enhancement of our children's education.

Among these schools is Colby-Sawyer College in the town of New London. In May of 2010, the board of trustees approved a Climate Action plan for the school in which the goal of having a carbon-neutral campus by 2050 was set (Currents, 2010). To make it more manageable, milestones were set up to have a fifty percent (50%) reduction in emissions by 2015 and a seventy percent (70%) reduction by 2020 (Currents, 2010). Since then, the school has made considerable progress in both outreach and implementation. Monitors have been installed in each residence hall on campus, and the science center, that give the students a visual measure of the energy usage of their dorm, and can be compared to other buildings. These monitors have helped students to learn more about energy reduction and make them more aware of their own energy usage.

In addition to this, the school contracted the ReVision Energy Company to install over 200 solar panels on the roofs of the science center, Lodge, Windy Hill preschool, and two

residence halls in 2012. The installation was complete by January of 2013 (Herb, 2013). Though the percentage is small, these panels have helped to reduce carbon emissions on campus, with an estimated 197,000 pound reduction in CO₂ (Herb, 2013). Following the success of the solar panels, the school has also been approved for a demonstrational installation of a fifty foot (50') wind turbine. Should the demonstration be successful, there are plans for installing more in and around campus.

A second school is also noted for its efforts in reducing their energy is Proctor Academy in Andover. With the help of its students, the private school has developed a mission statement that details their efforts to expand their environmental and sustainability education while also reducing their carbon footprint. The school presently gets their heating from geothermal, wood boilers, and biomass methods, with roughly twenty-five percent (25%) of their wood being collected on site (Fred, 2013). Proctor Academy has also made a contract with ReVision energy and have had 273 solar panels installed on their primary meeting building in 2012. The installations are estimated to reduce their annual carbon emissions by 121,000 or so pounds in addition to earning the school a savings around \$250,000 (Fred, 2013).

These two schools have had remarkable progress in reducing their energy dependency and carbon emissions. Much of it can be seen in the press and articles produced by local newspapers and companies. Their efforts are a strong example of what is presently going on among some of the school in the region. The goal is to lead by example and help usher in a system in which schools not only “walk the talk”, but become centers of learned and applied sustainability.

By taking the initiative to reduce their carbon footprint not only are these two schools reducing their energy consumption, they are also educating their student about the importance of

reducing energy usage. Perhaps even more importantly they are able to show their students that reducing energy consumption is possible even in today's world. This is an important part of any education. Being able to understand the importance of reducing energy and ways that it can be done are invaluable when it comes to confronting the big issues we face today such as peak oil and climate change.

The vision

This is an example of what a vision may look like.

Recommendation: This section should be continued to work on BY community members. Remember that this vision is for THEIR community. It will mean a lot more if it comes from residents who have lived here for a long time rather than college students who will live in this community for less than four years. This could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a "working group" dedicated to creating a vision for this section.

By 2030, education in schools is focused not only on math, science, english, and history but also around key sustainable principles. The schools themselves practice whole systems sustainability, creating a model for the society. Every school has a garden that produced about a quarter of the food served in its dining hall. Depending on the location and various other factors, the school utilizes renewable energy sources such as solar power for electricity, geothermal for heating etc. The curriculum is a combination of academic and practical studies. Students learn basic skills such as growing their own food, sewing and knitting, basic building that increases the students' personal resilience. When student graduate from school, they leave mastering a skill of their own that they can easily teach anyone. Students will take what they learn in schools back to their homes and practice it with their parents and the wider community. They will be equipped

with the skills they need for the new emerging post-carbon, decreasing their dependence on fossil fuels.

Vulnerabilities

While there has been considerable progress in reducing energy dependency among schools, the majority of educational institutions are still very much vulnerable to disturbances that may affect the availability of energy. The schools in the region depend on electricity and heating/cooling from companies that use fossil fuels. In addition to this, even the schools that have made reductions in energy use and use alternative energy resources will struggle to meet the needs of the students and staff should there be a deficit in energy availability or a drastic increase in price of energy. Even if energy continues to be available as it is today it prices stay the same or even decrease, there is still the problem of climate change. Most, if not all the energy that we use has been produced using fossil fuels which, as we know, increase the greenhouse effect of our planet increasing the overall temperature of the planet. This may not seem like a vulnerability but if we continue to increase the level of carbon dioxide into the atmosphere through our energy usage the effect could be detrimental to the resilience of our community.

This vulnerability is significant and should be a point of focus in the plans contained in this action plan. With schools being one of the primary forms of education and socialization for people ranging from children to adults, energy independence and sustainability is critical. Institutions such as these serve as examples that help to mold the minds of students. If schools remain dependent on unsustainable energy resources it will, in some way, reflect on those within them. As such, plans and efforts to make schools and places of education should be targeted while putting this action plan into practice.

Steps to Resilience

This is an example of a “Steps to Resilience Section”

Recommendation: I would still work with community members to makes sure that it is a practical as possible. As before work with community members who are knowledgeable in the particular area. These recommendations are just suggestions and can be changed.

Short Term (1-5 years)

- Work with Colby-Sawyer to reduce emissions
 - Develop practical energy plan for Kearsarge Valley school district
 - Set a practical emission reduction goal
 - Look for renewable energy options
- Have some sustainability principles taught as part of the regular curriculum

Medium Term (5-15 years)

- Schools in this area have made a major reduction in their energy consumption and have created their own plans on reducing energy consumption.
- Sustainability and resilience of our local community have become more incorporated into the curriculum.
- Students take a larger role in the community. The higher level classes hold information sessions to the community about certain topics.

Long Term (15-30 years)

- School districts have reached their goals of energy reduction

- There are now a variety of classes' students can take teaching "lost" skills.

Health

Health is very important part of our lives and one that is sometimes neglected.

American's health encompasses two different sectors, public health care and personal health and wellness. We spend a lot of money and energy making sure that we are healthy and although we live in one of the most affluent and technologically successful countries in the world our health is not among the best in the world. In fact according to the World Health Organization, the United States is ranked 37 out of 191 countries in terms of health, with countries like Norway, Singapore, Colombia, Morocco, Chile, and Costa Rica, ranked higher than the U.S. This is not for lack of trying however, for we do spend a lot of our money on the health system that we have in this country. A higher portion of the United States' gross domestic product is spent on the U.S. health system (World Health Organization, 2000). The problem is that we focus a lot on only one sector of the health system, public health care. It is important to understand that that these two sectors are intertwined and if one is neglected it will affect the health of the individual. So even though we spend hundreds of thousands of dollars on our health we are still relatively unhealthy compared to other countries around the world. One of the reasons that we do spend so much money on our health is due to the way the public health sector is set up; it is highly dependent on our current energy system as you can see from figure 4.0.

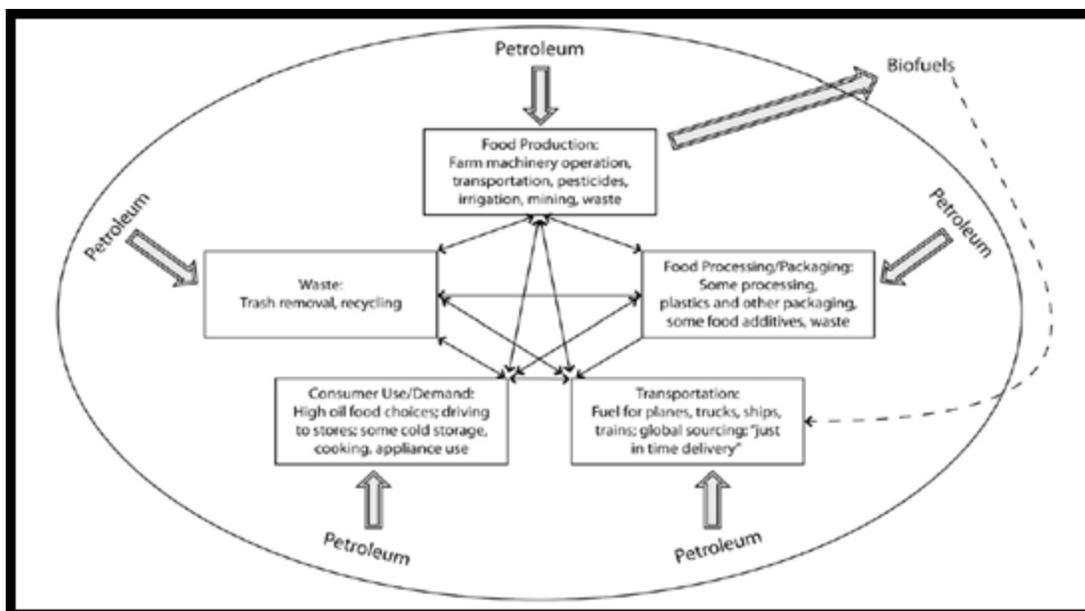


Figure 4.0

Neff, R. C. (2011). *Peak Oil, Food Systems, and Public Health Peak Petroleum and Public Health, 1587-1597.*

This is a linear relationship, meaning that there needs to be a high level of energy going into the system to keep it working.

Public Health Care

Public health care focuses on everyone in an area. The need of a centralized hospital, health care practices and wellness centers are essential for the overall wellbeing of the people in this area according to the health care perspective. This system is focused on the health of the whole. This sector is highly dependent on energy due, transportation of workers, patients, supplies, medication (transportation and production), organs, food and other aspects of our public health system. If the energy needed for our public health care system were to deplete, more illness would go untreated, and will lead to more deaths.

Personal Health and wellness

Each person has to be concerned about their own health and wellness, and there are many ways that the individual can make sure that they stay healthy. Such things as working out,

showering, brushing your teeth, and eating healthy are the focus of personal health and wellness. Practicing these small activities each day will allow for a healthier life. It is important to be healthy in every aspect of our lives because it allows for people to be happier in their everyday activities. If each person was to be concerned about their own health and wellness, there will be a cut down of the need for emergency care and long term intensive care. This is a very important part of the overall health picture because it is a much more sustainable and resilient form of the system that we have in this country. If we take care of ourselves everyday by making healthy choices then there will be less need to use the more energy intensive public healthcare system.

What does it look like?

Currently, our health care system relies on fossil fuels to get medical supplies and equipment, transportation, energy generation, and food production. Medicines, much like aspirin and antibiotics are made of petroleum based products (Neff, 2011). Without fuel, ambulances, doctors, nurses and other essential personal for hospitals will not be able to provide a health care system that is essential for Americans. Until this system is changed, our health care system is going to be vulnerable if the cost of fuel goes up and the supply decreases.

New London Hospital is the small local hospital that is used by the Kearsarge area. According to Alan M. Owens Director of Facilities this hospital uses approximately 105,000 gallons of oil each year. This means that the New London Hospital spends annually about \$315,000 on oil assuming the \$3.00 cost of oil per gallon. The Hospital also uses around 4,000,000 KWh or electricity. With electricity about \$0.72 per KWh this means that the New London Hospital spends around \$2,880,000. Of course we are fortunate in that we do have a hospital that services this community and one that is small and uses considerably less amount of energy than a major metropolitan hospital would. Having said that, the New London hospital is a

vital part of the community does require a lot of energy in order to create that public health sector in this area.

The New London Hospital also recognizes that the personal health sector is just as important and has helped to increase the personal health of this community. For example, New London Hospital invested \$5.3 million for community benefits. Out of that, \$4.2 million was given to free and subsidized patient care. The other money was used for community projects to promote healthy living styles much like smoke free hospital grounds and supporting outside groups that are working towards their same mission (New London Hospital, 2013).

The Hogan Sports Center provides a place for community members and students to exercise increasing their personal health. In the center there are cardio machines and weights. There is also a pool and gymnasium on the premises as well. A full time staff provides interested people with knowledge about how to properly use the machines and reasonable workout plans. There are also group fitness classes that allow for people to attend. These classes are open to all members and are taught by professional staff.

The Vision

Recommendation: This section needs to be done BY the community members. Remember that this vision is for THEIR community. It will mean a lot more if it comes from residents who have lived here for a long time rather than college students who will live in this community for less than four years. This could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section.

Vulnerabilities

With our dependency on oil and a decrease in supply, our health care industry will be one of the first ones to crash. With an already high price in health care cost, if the cost of oil and fossil fuels continues to increase, then people are not going to be able to afford it. People are

going to begin to be unhealthier because a trip to the doctor's office will cost too much money. If this becomes the case, people are going to start to have a lower life expectancy and more health issues. We need to remember that it would be very difficult for the hospital to become completely sustained by renewable energy. In an energy constraint world the Hospital will have the highest priority when it comes to fuel use.

New London Hospital is centrally located for people in New London, however it is the primary hospital for five surrounding towns (New London Hospital, 2013). If the cost of transportation increases, more people will not be able to afford the travel to this hospital. There will be a need for more localized care.

Steps to Resilience

***Recommendation:** This section needs to be done with the help of the community. This means that they need to have a good idea of the goals of this section and the overall EDAP. Find people how are knowledgeable in this area. REMEMBER THESE STEPS HAVE TO BE **PRACTICAL**. Again this could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a "working group" dedicated to creating a vision for this section. These current recommendations are suggestions and can be changed and added to.*

Short Term (1-5 years)

- Educate people on the importance personal health care
 - Eating healthy, exercising, etc.
 - Eliminating poor habits and enhance good habits
 - Smoking
 - Fast food

Medium Term (5-15 years)

- New London Hospital has created a way to increase personal health in the community.

Long Term (15-30 years)

- New London Hospital has invested in renewable energy for the future.

Food

Recommendation: This section may need to be formatted differently to align itself with the rest of the document.

Why is it important

“Local food does not solve issues of food security. However, it creates a more resilient food chain in Stroud district, and consuming local food creates a multiplier effect in the local economy, supporting jobs and creating community viability. Developing local food production capacity is one of the ways to optimize food availability in the future” (From a report by Transition Stroud, Hopkins, 59). Currently most of our foods travel nearly 1,500 miles from farm to table and this will only become a greater problem and increased expense, as finite fossil fuels continue to shrink. In addition, our modern food system is highly centralized and almost entirely dependent on oil. Indeed, our centralized food system relies on oil for both production and for transportation. “It is estimated that the U.S. food system uses 17 percent of the total energy consumed in the nation each year – about 10 barrels of oil equivalent per person” (Bloomington, 186). In other words, Americans are literally eating oil and gasoline. It is important to create a resilient food system so that we can provide some food for ourselves in an energy constraint world. There are three main ingredients that make up a resilient food system that are important for our local food system here in the Kearsarge Valley.

The three ingredients of a resilient system:

- **Diversity**
- **Modularity**
- **Tightness of feedbacks**

Diversity: Relates to the number of elements that comprise a particular system, be they people, species, businesses, institutions or sources of food.

-Diversity of potential responses to challenges that lead to greater flexibility.

-Diversity of land use – farms, market gardens, aquaculture, forest gardens, nut tree planting, and so on. The diversity between systems.

Modularity: The components that make up a system are linked.

-A more modular structure means that the parts of a system can more effectively self-organize in the event of shock.

-For example, as a result of the globalization of the food industry, animals and animal parts are moved around the world, leading to increased occurrences of diseases such as bird flu and foot-and-mouth disease.

-Reducing animal transportation and reintroducing local abattoirs and processing would lead to a more modular system, with local breeds for local markets and a much reduced risk of disease spreading.

Tightness of Feedbacks: Refers to how quickly and strongly the consequences of a change in one part of a system are felt and responded to in other parts.

- In a more localized system, the results of our actions are more obvious.
- We don't want excessive use of pesticides or other pollutants in our area, but seem happier to be obvious to their use in other parts of the world.
- In a globalized system, the feedbacks about the impacts of soil erosion, low pay and pesticide use provide weak feedback signals.
- Tightened feedback loops will have beneficial results, allowing us to bring the consequences of our actions closer to home, rather than their being so far from our awareness that they don't even register.

Where do we stand?

Before we can look at where we stand in terms of our local food system we must first describe what a food system looks like and how it works. A food system is comprised of inputs and outputs that create and distribute food. For example, an inflow into a system is fertilizer while an outflow is food that is produced and distributed, (see figure 8.0). "A local food system is a complex network of relationships between actors including producers, distributors, retailers and consumers grounded in a particular place" (Dunne, Chambers, Giombolini, & Schlegel, September 2010).

The components of a food system and the aspects that comprise it:

- **Compost**
- **Soil**
- **Seeds**
- **Farms**
- **Transportation**
- **Processing & Storage**
- **Distribution**

- **Consumer**
- **Table**

Most represented farming models in the Kearsarge Valley area:

- **Meat**
- **Dairy**
- **Vegetable**
- **Orchard production**

Collaboration between producers, consumers, and institutions is what makes a healthy food system. A healthy agricultural system can be the basis of communal strength, economic vitality, food security, and general resilience in uncertain times. Thus, growing and distributing food by focusing on transitioning from a globalized to a localized food system is key. In other words, operating on a smaller scale and decentralizing to a purely local level is ideal. For example, producers can rely less on buying fertilizer if nutrients are composted and reused in a system. In addition, if individuals and institutions within a system purchase food, the local economy benefits because the money circulates within the system. “Cheap oil has allowed us to rely on a massive wasteful food system” (Hopkins, 59).

To be specific, the local food system for the Kearsarge Valley area depends on at least 9 external inputs. (Colby-Sawyer, 2012) These external inputs are components that contribute food necessities from outside the region. They include seeds, compost, processing, farm equipment, labor, energy, government regulations, money, and non-local food. (Colby-Sawyer, 2012) In other words, the Kearsarge Valley Region counts almost entirely on 9 external inputs that contribute to their local food system.

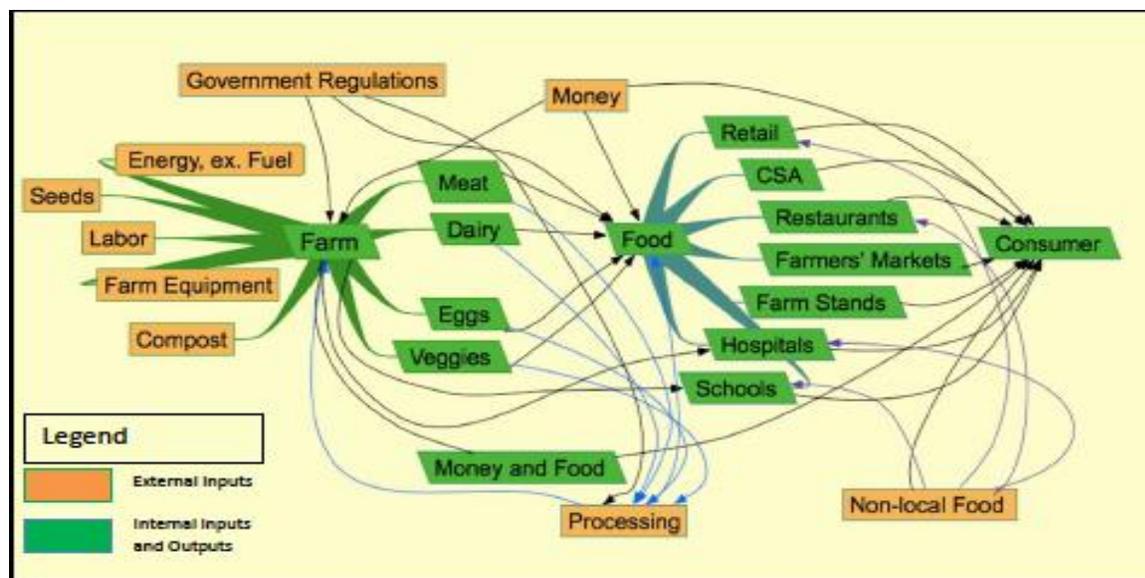


Figure 5.0

Orange = external farm inputs Green = Internal farm Inputs and Outputs

Current Food System Opportunities for the Kearsarge Valley Region:

- Food hub, a large shared location for farmers to process and distribute food.
- Use of colleges and schools as a marketplace, or use of kitchens.

Current Food System Strengths for the Kearsarge Valley Region:

- Farmers in the area have expertise and the ability to grow food effectively.
- The location of major roads such as Interstate 89 going through the area.
- High level of income of residents in the area.
- Support groups for farmers such as KAEL, and the UNH cooperative extension.

Markets for farmers to sell products.

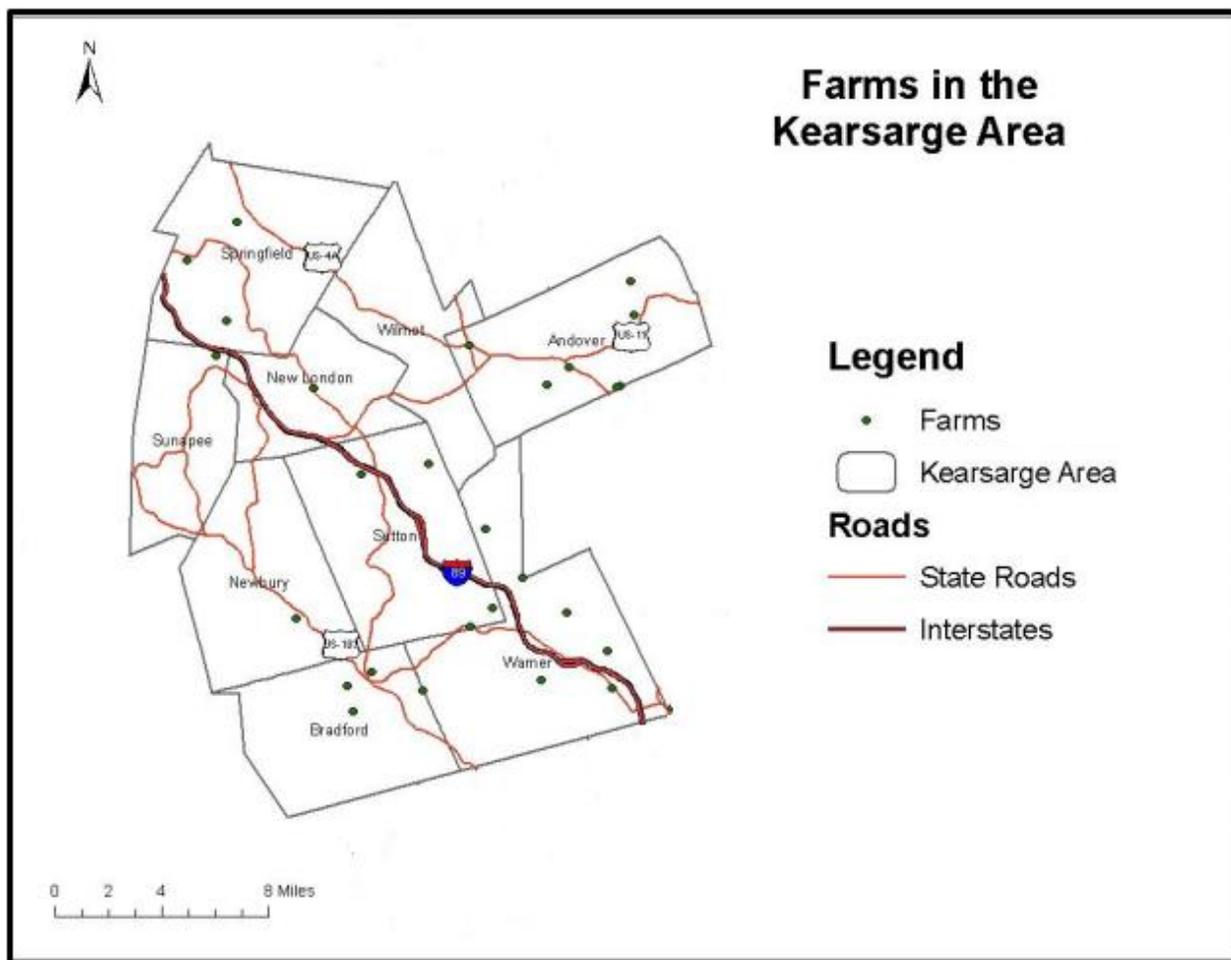


Figure 5.1

Adapted from 2012 Community Based Research Project Final Report

It is important to note that although there are farms in this Kearsarge Valley area that we have defined, there are sources of local food beyond that limit that are still local. We do have the ability to support ourselves for much of the produce that we consume. In the Kearsarge area, there are 116.5 acres in fruit production. The number of acres in vegetable production by town totals 450 acres. The highest areas of vegetable production are Boscawen and Warner, followed by Hopkinton and New London. There are 692 acres under dairy production in the Kearsarge area. The majority of the acres fall in Hopkinton, followed by Boscawen and Henniker. Meat production acreage totals 596 in the Kearsarge area. The majority of the acreage falls in Webster,

followed by Sutton and Springfield. There is a lot of more information about the food system in the Kearsarge area, although again a different definition of Kearsarge area. For more information about it please read the [Kearsarge Regional Food System: A comprehensive inventory and assessment](#) create by the 2012 Environmental Science/ Studies students.

The Vision

This is another example of a vision section:

Recommendation: This section should be continued to work on BY community members. Remember that this vision is for THEIR community. It will mean a lot more if it comes from residents who have lived here for a long time rather than college students who will live in this community for less than four years. This could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section.

There are many transition towns that have developed a resilient local food system. So before we envision what our local food system will look like in 30 years let us first examine the local food system of Hardwick Vermont.

The Hardwick Vermont local food system works:

So, what does a healthy food system look like? In the last 3 years, Hardwick’s agriculture infrastructure has been exploding with numerous food-based businesses and organizations. These food-based businesses and organizations include: Vermont Soy Company, High Mowing Organic Seeds, Jasper Hill Cheese, True Yogurt, Claire’s Restaurant and Bar, Pete’s Greens, Vermont Food Venture Center, the Center for an Agricultural Economy, The highfields Center for Composting, and Honey Garden Apiaries. These businesses and organizations have brought over a hundred jobs to the area. Important to this infrastructure is the Vermont Food Venture Center, which is a shared-use commercial kitchen and product

development, processing, packaging and shipping facility. Equally important is the Center for an Agricultural Economy which purchases acres of prime agricultural land. Recently, this organization established an Eco-Industrial Park which includes shared office space, year-round indoor farmer markets, farm and garden demonstration sites, and a communal composting operation. (Hewitt, 2-14)

With these food-based businesses and organizations in place, the Hardwick area was now ready to make their food system operational. The first component to allow Hardwick's local food system to operate in a closed loop fashion was to make sure the system would offer economic viability to small-scale food producers. In other words, if a small-scale, local producer couldn't compete with the "big dogs", then they have to offer "value added" or "artisanal" products, thus, turning commodity products into specialty products. The second component would be sunshine because it was recognized that we have become dependent on chemicals and petroleum to replace sunshine. Certainly, technologies have transformed the agricultural system to enable us to ignore the sun, but is this a desirable development? The third component was that the food must adequately feed the locals. Additionally, in order for a local food system to actually supply the local economy, it must find a way around the cost issue. Sadly, the irony is that people that can't afford a local food system because of the increased cost associated with producing higher quality foods are the same people that would benefit the most. So, this third supply component must be the infrastructure and knowledge that fashions the system. Importantly, showing the value that eating local saves money in the long run is crucial. Obviously, eating healthier results in fewer doctors' visits and decreases the chances of illness that would require costly medication. The fourth and last component of Hardwick's local food system is that it must be circular. Today, our current food system does not have a shape. In fact,

it starts at one point and goes in a million directions. The trick is to make a food system operate within fixed borders. For example, within a 10-mile radius of Hardwick, you will find a seed producer, a composting facility, vegetable farms, a processing facility and a distribution facility. Furthermore, the entire Hardwick area could be fed on food that grew from its local seed producer, (Hewitt, 43-52).

In 2030 the Kearsarge Valley will have a much stronger local food system. Local farmers are a much more important part of our community. As a result the Kearsarge area is an attractive area for young farmers. We have created a system that brings the older and younger generations closer by working together. The elders of the community who have enough money to own land allow younger farmers to work that land. In this way it is much easy and affordable to produce local food. Although we have had farmers markets in the past, they are now year round and are attended much more regularly by the Kearsarge citizens. Not only has our local farming increase we have also seen a dramatic increase in food not lawns. Most people in town now have simple gardens that supply them with some food. Those that do not have the land to have a private garden have taken part in a community garden. People are a lot more interested in learning farming techniques and the community garden really helped to increase the sense of community between people.

Vulnerabilities and Challenges

Current Food System challenges for the Kearsarge Valley Region:

- Lack of communication, network, and collaboration amongst farmers.
- Limited infrastructure support, in a form of shared information and tools amongst farms.

- Lack of a processing facility, both on farms or a large shared processing facility for all the farms in the area.
- Limited shared transportation and distribution.
- Lack of storage facilities for produce on farms or shared facilities.
-

How to develop a closed loop local food system in a northern climate:

The question arises, how can you develop this closed loop local food system in a northern climate like Hardwick or like the Kearsarge Valley Region? The answer is difficult, but when you create this system in a northern climate you need to understand that there will be no bananas in January, actually none at all, and seasonal foods become the main focus (Hewitt, 52). Because of the reality of the short growing season, greenhouses and storage facilities for local production will be necessary. While factory processed foods are not desirable, local canning and other methods of preservation may be used.

Current Food System Threats for the Kearsarge Valley Region:

- Big supermarket providing food at a lower price than some farm goods.
- Climate conditions, climate change, and pests changing how farmers must grow food.
- Perception of consumers, and cost of local food.
- Political/legal (GAP certification), forcing farmers to become certified, in order to compete in some markets.
- Technology, in the form of high cost of updating farm equipment.

Farmers markets are fragmented and do not always collaborate with each other.

Steps to Resilience

Recommendation: *This section needs to be done with the help of the community. This means that they need to have a good idea of the goals of this section and the overall EDAP. Find people who are knowledgeable in this area. REMEMBER THESE STEPS HAVE TO BE **PRACTICAL**. Again this could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section.*

Short Term (1-5 years)

Medium Term (5-15 years)

Long Term (15-30 years)

Waste

Humans have always generated waste and in many different forms; everything from plastic bottles, to old rusty cars. Natural processes, such as dilution, dispersion, and degradation, in the past have been able to handle the small accumulation of waste produced (solid and liquid waste management), however with a dramatic increase in the human population we have gotten to a point where the amount of waste that we produce cannot be handled by these natural processes. When this growth in population is coupled with the culture that we have in this country, the “American Dream” being perhaps the most prominent, in which we consume as much “stuff” as we can, the problem of waste grows in magnitude. Many don’t think about the impact this can have on our energy consumption, as they continue to buy new “stuff” and throw away reusable or recyclable items. Tying the black bag and placing it on the curbs takes the waste out of sight and out of mind. Yet, as we dispose of more materials our need for more items is unchanged. Waste can be seen in two ways: solid and water waste. The two require different systems for disposal, sanitation, and reuse. These systems, as well as human thinking, is the way

to adjust the amount of waste needed to be handled. We examine the current waste system in the Kearsarge Valley and determine intervention points.

Why is it important

There are several reasons why the production and disposing of waste is important to examine now and in the future. Acreage for landfills, transportation of waste, and overconsumption are all negative factors that are associated with waste production in the United States and throughout the world. “Forty percent of US greenhouse gas (GHG) emissions are linked to the use of material goods and their disposal” (Environmental Protection Agency). While the number of landfills has declined in the United States, the size of the remaining landfills has increased. The problem is that our waste production has not dramatically decreased over the past few decades. While 2009 data from the EPA shows that, for the first time, solid waste production has actually decreased from the following year, the amount of waste produced is still relatively high (Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2009, 2009). Fuel is combusted during the transportation of all of that waste as well which has both an economic and environmental cost. One of the drivers, perhaps the most important, of producing all of the solid waste experienced across the US is overconsumption. Clothes, iPods, refrigerators, microwaves, shoes, cars, boats, and so much more are thrown away on a daily basis to make room for newer things in households. When items are thrown away, virgin materials (extracted natural resources) are needed to create more of the “stuff” that we desire (Northeast Recycling Council, 2010). Many of those items are petroleum (oil) based. Every time we consume more and more “stuff” not only are they transported to the various areas where they are later sold, the production of the items themselves rely on oil. All of those items thrown in the plastic bags go somewhere, but most don’t care

because, again, it is out-of-sight and out-of-mind. If the rest of the world consumed as much “stuff” as Americans, then we would need three planets to sustain the world population (Moffatt, 2000). Just imagine how much energy goes into the production and transportation of all that “stuff.” If we can find a way to reduce our waste and implement a reduce, reuse, recycle policy we can cut down on our energy footprint while becoming more resilient.

What does it look like now

In order to understand the bigger picture we need to break it down starting at the state level. “The current recycling rate in New Hampshire is less than 21 percent, well below the national average of 32 percent” (New Hampshire Department of Environmental Services, 2009). New Hampshire is still a very large area to look at and change, over a short period of time, unless we look at changing all of the parts that make up the Granite State. The Kearsarge Valley, which we define as New London, Newbury, Bradford, Sutton, Springfield, Andover, Warner, Sunapee, and Wilmot, is an area of focus that can make several changes in regard to waste production, disposal, and recycling. Before recommendations can be made, we must first understand where each of the towns stands currently.

Based on the community profiles, developed by the Economic and Labor Market Information Bureau of New Hampshire Employment Security, we were able to find out the strategies of waste disposal and recycling in the area. The information, gathered from 2011 to 2012, shows that none of the towns have a “pay-as-you-throw program” and only five out of the nine towns have mandatory recycling. Only one of the towns, New London, has curb side pick-up of trash. This means that trash must be hauled, by the residents whom don’t live in New London, to a nearby waste disposal site. This could be seen as a benefit, as it forces people to handle their own waste as well as reduces the cost of hiring employees for hauling. All towns in

the Kearsarge Valley, except Springfield which residents use Sunapee's resources, have a transfer station which separates the recyclables and trash. Sutton, Bradford, Sunapee, Springfield, and Warner all have mandatory recycling programs implemented. Each town has established their own pricing on disposal of materials. For example, Warner transfer station has a complete list of what item they charge for disposal (small tires cost \$1 each, lawn mowers cost \$5 each, and furniture costs \$5 each) and the particular items that are recycled. Having a list not only informs the public of how the station operates, but it puts a cost on throwing each item away. Placing a cost per weight can prevent the throwing away of materials that could have been reused or recycled.

Currently, the transfer stations in the area provide reports on the volume of trashed received annually and the amount of material that was recycled. These "waste audits" provide valuable information as to the progress of an area to recycle. For example, in 2009 the town of Sunapee, and Springfield, experienced a decrease in volumes of trash delivered to the transfer station. Recycling was down 2.4% from the following year but they may be influenced by the overall volume of trash and recyclables delivered. Not only does the report provide percentages of materials processed but it displays environmental benefits of recycling individual products like "269 tons of paper recovered saved 4, 573 trees" or "157.2 tons of scrap metal recovered conserved 78.5 tons of coal" (Bergeron, 2009). It is a way to commend the public for a job well done. One subject that is not discussed in many of the reports is food waste.

Food should be feeding people, not landfills. Food makes up the largest percentage of landfills according to data collected from the 2010 Municipal Solid Waste Characterization Report. "33 million tons of food waste reaches landfills each year in the United States" (Environmental Protection Agency, 2010). Food takes up room in landfills which forces landfills

to expand or to combust more materials to increase capacity. Also, food that rots in landfills adds to the methane levels which increase the greenhouse gas emissions for the location. Newbury, and several other towns, compost leaves and lawn trimmings but it does not appear that towns look toward community composting to reduce solid waste disposal. In 2009, across the United States, there only existed 3,000 community composting programs which was actually a decrease from 3,227 in 2002 (Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2009, 2009). There are many areas that we can improve on for the prevention and disposal of waste in this area.

The vision

Recommendation: This section needs to be done BY the community members. Remember that this vision is for THEIR community. It will mean a lot more if it comes from residents who have lived here for a long time rather than college students who will live in this community for less than four years. This could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section.

Vulnerabilities

Much of the resources (clothes, toys, cars, etc.) are shipped in and thrown away relatively early in the product lifecycle.

Oil is used to not only ship the items, but to produce many of the items. A majority of the items that people have and want are affected by the availability of oil. Despite the unpredictable future of oil, people are still throwing away reusable items. Warner transfer station has a “Swap Shop Area” which allows people to leave items that are able to be reused and allow others in the

community to take those items. While this does allow for items to be recirculated, it does not prevent the reduction of new items purchased from outside the area.

Fertilizers are needed to support the farms and gardens in the area.

Oil is needed to produce and transport many of the fertilizer products used by farmers and residents of the area for food and lawn maintenance. As lands become more and more exhausted, a need to enhance soil nutrients rises. When food and other compostable materials are thrown in the landfills, they cannot be utilized by the community and are eliminated from the system. This continues the need for nutrients to be brought to the area rather than circulating already existing nutrients.

Steps to Resilience

This is another example of a “Steps to Resilience Section.”

Recommendation: I would still work with community members to make sure that it is as practical as possible. As before work with community members who are knowledgeable in the particular area. Perhaps working with the community members who work at the transfer stations would be helpful. These are suggestions and can be changed if necessary.

Short Term (1-5 years)

- Buy Less Stuff: As stated before, overconsumption of items is one of the main contributors of waste in the United States. Whether it buying is buying new clothes or getting the new iPod in stores, people are trying to create an image with the things they buy. Education to the public about overconsumption should be provided. In schools, at events, and through public announcements, reasons to not buy more and reuse should be presented. A survey should be utilized to see how peoples’ feelings are toward

purchasing items. This could be a way to visually show people how they make choices and the consequences/successes that follow.

- Educate Children on Needs vs. Wants: Advertisement is a strategy employed by many companies to convince children they need more “stuff.” We need to begin to educate children at a younger age the difference between a want and a need. Incorporating this into children’s education would help reduce the issue of overconsumption in the future because they will already understand, when they get older, that they neither they nor their children need more stuff. “Enoughness” will be more recognizable with education.
- Educate on Composting at Home: Developing educational programs on techniques for composting and the benefits for home use will help reduce the amount of food waste that is disposed as trash and into landfills. There already exist programs that help do so. The town should utilize these already existing programs and promote them within the town.
- Support Thrift Shops and Repurposing Stores: Rather than going to Walmart or other “one stop shops,” why not utilize thrift shops? The region should be helping promote these shops as they reduce the amount of new items we buy and resources that we are consuming. Repurposing stores could be places that take the items that are deemed “unusable” and transform them into items that the public needs. For example, old, torn-up clothes could become sheets and blankets; creating a more circular, rather than linear, system.
- Develop Annual Day to Celebrate Town Waste Savings: One of the main concepts in a transition initiative is that it is important to reward accomplishments. When a town, or region in this case, reduces the amount of waste it is disposing of it needs to be celebrated. Whether it is through reduction in consumption or diversion of waste through

recycling or reusing, people and organizations should be recognized through the help they have provided to the area.

Medium Term (5-15 years)

- Community Composting: Across New York City there are efforts to increase composting on a community level. Brooklyn, Manhattan, and Queens all have areas where compostable material can be dropped off and processed. The Kearsarge Valley can do this too! Restaurants, businesses, and residents of the area all have food waste that can be used for both personal and communal purposes. For those who do not want to compost or want to “donate” their table scraps, then community composting could be of use. The composted product can be used as fertilizer to be sold in the community as well as be used in a community garden that produces food for the community.

Long Term (15-30 years)

- Zero-Waste Region: The Kearsarge Valley should set an exact time on when they want this area to be “zero-waste”. Composting efforts, recycling, reusing, repurposing, and reducing consumption are all efforts that should lead this area into producing waste. The transformation from a linear system (where items go through once and are thrown away) becomes a loop. The areas used for waste could now be used for other purposes. Jobs involved with waste would be lost but more opportunities would open, such as composting and repurposing within the community. It would be a major accomplishment and milestone for the region.

- *Recommendations for Next Third-Year Class*

1. ***Include more research on water waste and sanitation'***

The main focus of this waste analysis was for solid waste. Water waste is another portion to the subject of waste. There is another system that operates to collect and process what the town produces. Resources exist, such as water treatment plants, that can be used to recognize energy used and points that can be adjusted to improve the system in a positive way.

2. ***Increase research on how waste is processed within the Kearsarge Valley***

The process of waste collection was briefly touched in this section, but there is more research and knowledge to be gained on the subject.

3. ***Survey the people and figure out their thoughts on consumption and waste***

Consumption patterns and feelings toward buying items are one of the main contributors to waste. Finding how people feel and think about items may present ways to address overconsumption and therefore waste.

4. ***Work with the food group to find out the amount of fertilizer used***

There is much overlap between the food and waste. Food is what makes up a majority of residential waste. Composting is a major suggestion as it reduces food waste and provides fertilizer. How much fertilizer is used by residents would help depict the reliance on outside resources as well as the reason to utilize personal and communal composting programs. Working with the food group would help strengthen the loop between food and waste.

Transportation

Why is it important

Transportation in Kearsarge Valley is one of the most petroleum dependent sectors. The sector accounts for a significant amount of greenhouse gas emission in the atmosphere. Residents of Kearsarge Valley depend on cars, vans, trucks and other vehicles that run on petroleum to

travel from one place to the other. Lack of employment opportunities in the region compels a person to work farther away from their homes which means more transportation and higher use of non-renewable gas and greater production of greenhouse gases. Residents of Kearsarge Valley also depend on oil and transportation for producing and shipping food, clothing, medicines, and almost every other daily necessity. The region has potential to address this main source of pollution and oil use through transportation sector by adapting to several different ideas, plans and laws. The region should invest great amount of money on public transportation, cycle paths, pave pedestrian paths. It should raise awareness of people, encourage them, provide incentives or make it mandatory for every household to install renewable energy sources in their homes (make homes eco-friendly). Schools and colleges in the region should incorporate courses that teach children about effective ways to reduce, reuse, recycle, and encourage them to walk or bike to school whenever possible. Efficient land use planning, reduction in municipal vehicle fleet fuel use, effective use of street lights (switching them off during day times), and establishing a centers for recycling and reprocessing vegetable and mineral oils for and from vehicles are the other ways that the region can address the problem of peak oil.

What does it look like?

Pristine lakes, ponds, and beautiful mountains in Kearsarge Valley attract hundreds of tourists every year, especially during the summer. Tourists travel to Kearsarge area by road in bus, cars, and motorcycles. There is not a lot of public transportation options in Kearsarge Valley, so local people as well as visitors are compelled to either rent a car or own a vehicle of their own to travel from one place to the other. During good weather in summer and fall, people are seen in streets riding their bicycles, skate boarding, and walking to nearby places. However, the mild, warm weather does not linger for a long time in Kearsarge Valley, which means people have to opt to ride cars, vans, and buses to any destinations, whether it is short or long distant.

Kearsarge Valley does not have separate and safe routes for bike riders to travel on. The number of cars, trucks, and other vehicles on roads create unsafe and unfriendly atmosphere for pedestrians, skate boarders, and bike riders. Local residents of Kearsarge Valley travel long distances every day to go to their work, businesses, or grocery stores. Visitors, vacationers, and even the residents of this region are in great need of efficient public transportation. Improvement in transportation sector will eventually help in building self-resilient, environment friendly communities. It also increases accessibility to beautiful places, encouraging higher number of tourists, which in turn will increase the local economy of the region.

Data, on percentage of working groups commuting to work, produced by New Hampshire Employment Security (NHES) and Economic + Labor Market Information Bureau (ELMI) clearly shows the need of public transportation and other sustainable transportation options in the Kearsarge Valley region. The following table provides facts from 2007-2011 and compares the percentage of varied transportation systems used by workers of ages 16 and over to commute to their work among the nine towns in Kearsarge Valley. The table also contains information on such topics as mean travel time to work and percent of residents working in different places (within neighborhood, within NH community or out of state).

PERCENTAGE OF KEARSARGE VALLEY RESIDENTS COMMUTING TO WORK									
Towns	New London	Sunapee	Andover	Warner	Sutton	Newbury	Bradford	Wilmot	Spring field
Workers 16 years and over	(in percent)								
Drove alone, car/truck/van	82.3	74.9	76.8	73.4	81.1	72.2	79.6	82.9	66.7
Carpooled, car/truck/van	7.1	7.1	4.7	10.3	5.5	8.1	8.5	5.2	16.4
Public transportation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
Walked	2.1	4.0	6.1	5.8	2.0	14.1	1.7	0.4	3.4
Other Means	2.0	4.7	6.8	3.1	2.7	1.8	5.1	1.3	4.7
Worked at home	6.4	9.4	5.6	7.5	8.6	3.7	5.1	9.7	8.8
Mean Travel Time to Work	33.7 min.	26.7 min	30.4 min	30.8 min	26.7 min	19 min	35.3 min	34.7 min	27.2 min
Percent of Working Residents:	(ACS 2007-2011)								
Working in community of residence	62.1	47.8	70.8	76.8	64.4	62.1	64.3	66.1	35.0
Commuting to another NH community	28.1	42.9	26.2	18.0	32.6	33.1	29.2	28.7	61.4
Commuting out-of-state	9.8	9.3	3.0	5.2	3.0	4.8	6.6	5.2	3.6

Source: "Community Profile." NHES: New Hampshire Employment Security. ELMI: Economic+Labor Market Information Bureau.

The vision

This is yet another example of what a vision section may look like:

Recommendation: This section should be continued to work on BY community members. Remember that this vision is for THEIR community. It will mean a lot more if it comes from residents who have lived here for a long time rather than college students who will live in this community for less than four years. This could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a "working group" dedicated to creating a vision for this section.

In 2030, Kearsarge Valley is a successful transition valley. Partnerships between grocery stores and local farmers and businesses have considerably decreased oil use in transportation of food and cost of shipping. Proliferation and the strengthening of local businesses as well as

farming opportunities have provided employment opportunities for people in the region; most of the people bike or walk to their jobs with only few individuals traveling more than half an hour to their work. Public transportation connects all the main area in every town, which has steadily reduced the need of private car ownership. Those that still own cars carpool with others. These cars also can be run on bio-fuels. It has made Kearsarge Valley safe for bicycle riders and pedestrians. Therefore, residents are determined to ride bike and walk to nearby places, which has improved their health and has encouraged relationship among neighbors. The region is clean, green and healthy.

Vulnerabilities

Transportation is a very important part of our modern system that relies almost completely on fossil fuels. Most of the things we need to survive are transported here. In an energy constraint world the cost of transportation will increase significantly. This could affect people's ability to get to work. It could also affect our tourist aspect of our economy. This is a very simple vulnerability but one that could affect all of the other sectors of our community if we do not create a more resilient community.

Steps to Resilience

This is another example of a “Steps to Resilience Section:”

Recommendation: I would still work with community members to make sure that it is a practical as possible. As before work with community members who are knowledgeable in the particular area. These are suggestions and they can be changed.

Short Term (1-5 years):

- Encourage people and provide incentives for people to car pool, and bicycle to schools, colleges or any closer destinations.
- Establish ride and car sharing programs.
- Enforce no idling policy in the area

Medium Term (5-15 years)

- Increase the number of bus services from Kearsarge Valley to other cities and states.
- Replace existing diesel/ petrol stations by such fuel alternatives as bio-fuel and bio-diesel.
- Provide incentive for people who drive cars that run on solar batteries.
- Create biking lanes for people.

Long Term (15-30 years)

- Construct roadways and railways for public transportation that connects every town in Kearsarge Valley.
- Pave pedestrian paths in all the towns.
- Build bicycles paths alongside every roads.

- Inspire groceries not to import any vegetables and fruits; local farmers and local businesses provide enough produces for all the residents in the region.
- All work places and homes have solar paneled roofs, so people charge their cars batteries rather than fueling them with non-renewable resources, oil and coal.
- Almost all residents work in the region for local businesses.

Tourism

Why is it important

In the summer months tourists who have traveled here for vacation heavily support the local economy in the Kearsarge Valley region, much like the rest of the state of New Hampshire. In order to avoid a collapse of local businesses in the area it is important for the residents of the community to begin to strengthen the local economy now. This will help to support it in the event of a collapse of the tourism industry. Ways to support the local economy include buying local food, goods, and services.

Where do we stand?

The Kearsarge Valley region is a popular spot for tourism, both in the summer and winter. Tourist activities include water sports, boating, fishing, camping, hiking in the summer as well as skiing and snowmobiling in the winter. Many of the tourists that visit the region come from locations such as Massachusetts, Connecticut, Rhode Island and New York. All of these locations require a great deal of energy to travel from to reach the Kearsarge Valley region. With fuel prices on the rise it is possible that the tourism industry in the region could suffer, especially any activities requiring fuel usage (boating, snowmobiling). Rising energy price could cause an increase in lift ticket cost at ski areas making it harder for the public to afford a weekend vacation on the mountain. The cost of travel alone may become too great to travel to

the region from locations from far away. This would cause harm to the local economy by causing not only a reduction in jobs, but also a decline in cash flow through the region.

The vision

Recommendation: This section needs to be done BY the community members. Remember that this vision is for THEIR community. It will mean a lot more if it comes from residents who have lived here for a long time rather than college students who will live in this community for less than four years. This could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section.

Vulnerabilities

The vulnerabilities of this sector are very similar to transportation. Tourism is affected by transportation which is affected by fuel costs. One affects the other. We need to make sure that our economy is not reliant on tourism in the future so that we can be resilient at a time when this area is not longer an option for those that come here for the summer and winter attractions.

Steps to Resilience

*Recommendation: This section needs to be done with the help of the community. This means that they need to have a good idea of the goals of this section and the overall EDAP. Find people how are knowledgeable in this area. REMEMBER THESE STEPS HAVE TO BE **PRACTICAL**. Again this could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section.*

Short Term (1-5 years)

Medium Term (5-15 years)

Long Term (15-30 years)

Energy

Recommended: This area needs more work. This section is really looking at the overall consumption of energy in this Kearsarge area. It is essentially a way to connect each sector and conclude our assessment of this community in terms of energy consumption. Obviously this means that this section needs to be completed after all other sections are completed. This section

can be changed to a different format to accommodate some more information. For example potential of renewable energy in this area, (There should be a GIS project on potential wind power in this area). Some resource that we can look at is the NH Department of Energy--- providing renewable energy in this area. Again we need to use this section to bring everything together.

Why is it important

As much of this report has stated, energy is the foundation to our society. Without it we would not be able to many of the things that we rely on in or everyday lives. We are highly dependent on energy. What makes this system a problem is that we create most of our energy from non-renewable fossil fuels. Not only are we facing peak oil that will affect the supply and consequently the price of our energy but we are also impacting the very climate of our planet. If we are to create a resilient community that will be able to absorb the impacts of peak oil and future climate change then we must look at how the Kearsarge area uses energy and we must find ways in which we can reduce our overall consumption of fossil fuel produced energy.

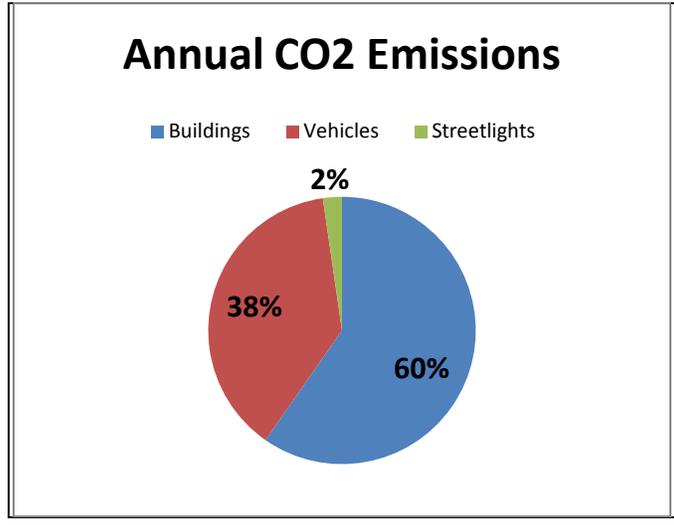
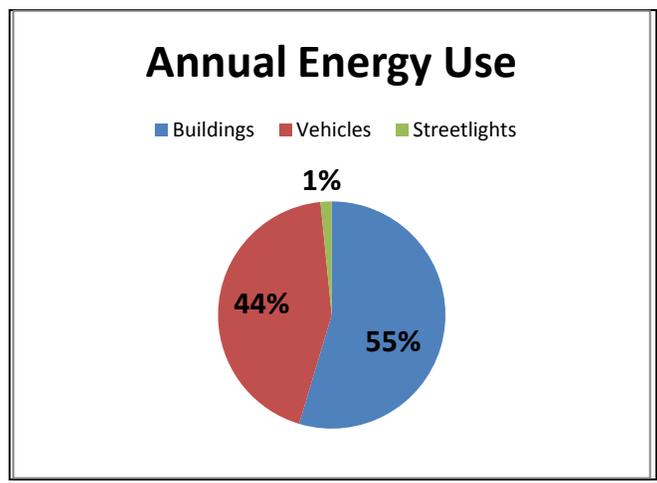
Where do we stand?

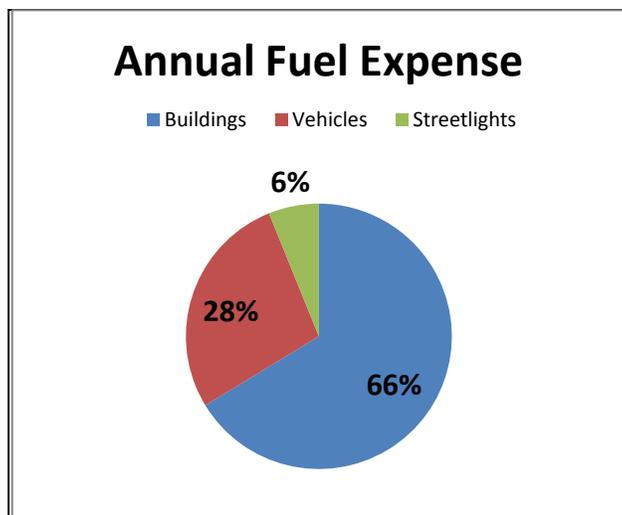
Much of the energy that we use in the Kearsarge area is from non-renewable recourses. There are two suppliers of electric energy in this area, Public Service of New Hampshire (PSNH) and New Hampshire Electric CO-OP.

Towns	PSNH	NH Electric CO-OP
Andover	47	1260
Bradford	1129	----
Springfield	724	164
Sutton	1046	44
Sunapee	2185	535
New London	2759	----
Newbury	1797	----
Wilmot	32	734
Warner	1676	----

There are three main oil suppliers in this area, Irving oil, Eastern Propane and oil and Rymes Propane and oil.

New London uses a lot of energy for just their municipalities. New London partnered with Vital Communities to do an energy audit of the municipal in New London. In total New London uses 8372.5 MMBtu worth of energy annually. That translates to 1,536,170 pounds of carbon dioxide annually and about \$220,595. This is a lot of energy for just the municipalities for one of the nine towns in our community. The following graphs are from Vital Communitites showing the how each area (buildings, vehicles, streetlights) affects the energy use, expense, or carbon dioxide emissions.





The Vision

*Recommendation: This section needs to be done **BY** the community members. Remember that this vision is for **THEIR** community. It will mean a lot more if it comes from residents who have lived here for a long time rather than college students who will live in this community for less than four years. This could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section.*

Vulnerabilities

Steps to Resilience

*Recommendation: This section needs to be done with the help of the community. This means that they need to have a good idea of the goals of this section and the overall EDAP. Find people who are knowledgeable in this area. **REMEMBER THESE STEPS HAVE TO BE PRACTICAL**. Again this could be done in a variety of ways. You can interview many different community members who are knowledgeable in this particular area. You could also during an event have a “working group” dedicated to creating a vision for this section.*

Short Term (1-5 years)

Medium Term (5-15 years)

Long Term (15-30 years)

Conclusion

Recommendation: This conclusion must impress upon the reader the importance of this EDAP. It would be nice to have a broad vision for the Kearsarge Valley area. Again this can be done with community members or by putting together key elements of all the visions in the document. This will be the last section people will read. Make sure it grabs their attention and makes them feel like they can make a difference!

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