

**NORTHERN ECONOMIC CONSULTING, INC.**

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**The  
Economic Impact  
of  
the VY Station  
on  
Windham County and Vermont**

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## Executive Summary

This study estimated the impact of the Vermont Yankee Nuclear Power Station (or “VY Station”) on the economy of Windham County and the state of Vermont under two scenarios. The first scenario assumes the VY Station is relicensed for twenty additional years and continues operating past March 2012. The second scenario assumes the plant ceases operating in 2012 and is decommissioned in 2032 after a period of safe storage or “SAFSTOR.”

Today there are more than 620 employees including contract employees at the VY Station with a payroll of about \$60 million. This employment will increase slightly in the next few years. If operations cease, the employment and payroll will be replaced by a lower amount needed to maintain the plant safely until it can be decommissioned. The differing economic impact from these two scenarios is very large.

- Over the period 2012 through 2031, there would be an average of 1,232 more employees in Windham County with the VY Station operating than with it shut down. In the rest of Vermont there would be an average of 342 more employees if the VY Station keeps operating.
- Over the period 2012 through 2050, all Windham County employers, including the VY Station, would have a payroll that totaled \$2,165 million (in constant 2008 dollars) more than if the plant was relicensed than shutdown. In that same period, employers elsewhere in Vermont would have a payroll that totaled \$343 million more with the plant operating than without it.
- Over the period 2012 to 2050, Windham County residents would have a disposable income that totaled \$2,392 million more if the VY Station keeps operating rather than shuts down. Elsewhere in Vermont residents would have a disposable income that totaled \$523 million more with the plant operating than without it.
- During the period 2012 to 2031, Windham County would see a population decline of about 600 residents if the VY Station was shut down as opposed to relicensed.
- The State of Vermont would lose a total of \$313 million in tax revenues over the period 2012 through 2050 if the VY Station was shut down instead of remaining in operation.
- Finally, local governments in Vermont would see a total revenue decline of \$92 million from 2012 through 2050 under the shutdown scenario as opposed to the relicensing scenario.

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## I. Introduction

Entergy Nuclear Vermont Yankee, LLC (“Entergy VY”) asked Northern Economic Consulting, Inc. to estimate the economic impact of the operation and eventual decommissioning of its power station in Vermont (“VY Station”) under two scenarios. The first scenario assumes the VY Station is relicensed and continues in operation until 2032, then is decommissioned beginning in 2032, and finally all spent fuel is removed by 2083. The second scenario assumes the VY Station ceases operation in 2012, enters the SAFSTOR mode until the power station is decommissioned from 2032 to 2039, and finally all spent fuel is removed by 2043.

The first scenario is consistent with Entergy VY’s current request to relicense the plant for an additional twenty years. The second scenario assumes a reasonable time frame for completing decommissioning given current financial conditions.

We provide an analysis of the economic impact from these two scenarios in the following six sections of this report. In section II we review the current condition of the Windham County and state of Vermont economy. It is necessary to have an understanding of the local economy to grasp the magnitude of the economic impacts from the VY Station. In section III we briefly discuss the importance of the VY Station’s employment and payroll to the Windham County and Vermont economy.

In section IV we present our estimate of the impact of the VY Station on economic activity in the county and state with the relicensing scenario. We do the same in section V with the scenario of shutting down the VY Station in 2012.

Finally, in section VI we present the economic impact of the VY Station under these two scenarios by comparing employment, payroll, disposable income, population and tax revenues in the county and state. A knowledgeable reader could skip directly to section VI.

The reader of this report should always keep in mind that these are estimates of the likely future economic impact of the VY Station under these two scenarios. We use the best estimation techniques available today along with the current estimates of the future costs given in the two scenarios described above to obtain our estimates. However, they remain estimates and should be interpreted with appropriate care.

## II. The Vermont and Windham County Economies

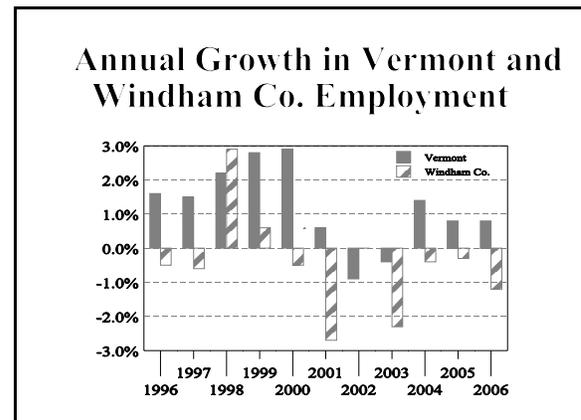
In order to fully understand the economic impact of the VY Station on the state and local economy, it is necessary to review the recent history of the economy's performance. In this section we briefly present and examine the state's and Windham County's employment and income growth over the last ten years. In addition, we review the major demographic changes affecting the state and local economy in this period. Lastly we present a basic sketch of the Windham County economy.

It is clear that economic activity in Windham County has significantly lagged that of the rest of Vermont. In addition, even as Vermont is a slow growing state from a demographic perspective, Windham County is even a slower growing area. This suggests that any major, negative economic impacts could be felt more acutely in Windham County than elsewhere in Vermont.

### A. Measures of Economic Activity in Vermont and Windham County

#### 1. Employment and Unemployment

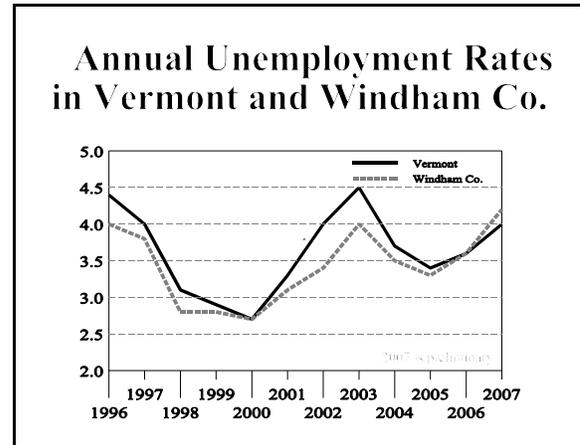
The Vermont Department of Labor (VDOL) publishes an annual count of the number of payroll jobs at Vermont businesses. This includes about 80% of the state's employment, excluding the self-employed. The graph to the right shows the annual job growth from 1996 through 2006.<sup>1</sup> Job growth in Windham County has lagged that of the state as a whole in ten of the last eleven years. In only two of those years did Windham County post a job gain.



From 1996 to 2006, employers in the state of Vermont added 32,842 jobs, a cumulative gain of 12.1%. However, in Windham County the number of jobs declined by 865, a cumulative decline of 3.7%. While total wages paid at all employers in the state grew by 63%, from \$6,618 million to \$10,781 million, in Windham County total wages grew 36%, from \$566 million to \$768 million.

<sup>1</sup> The estimate for 2007 will not be available until March 2008.

VDOL also publishes an annual estimate of the unemployment rate for the state and Windham County. This is the most frequently used measure of economic hardship in the regional labor market. The graph to the right shows the annual unemployment rate in Windham County from 1996 to 2007. Based on the low job growth, it is initially somewhat surprising that Windham County's unemployment rate has remained below or equal to the state's rate during most of the period under review. However, it appears that Windham County's unemployment rate is no longer lower than that of Vermont as a whole as shown in 2006 and 2007.



## 2. Wages and Income

The third measure of economic activity is wages and/or incomes. The VDOL publishes an annual average wage per job for the state and Windham County. This is shown below.

Average Wage per Job			
	1996	2006	Change
All Vermont	\$24,479	\$35,557	45.3%
Windham County	\$24,079	\$33,949	41.0%

In 2006, the average wage per job in Vermont was \$35,557, up 45% from 1996. In Windham County the average wage increased slightly less, 41%, to \$33,949.

The above figure is the average wage from a job in Windham County. Because many county residents work outside the county, it is also illustrative to look at the resulting incomes of county residents.<sup>2</sup> This can be obtained from the Vermont Department of Taxes, based on data from the state's personal income tax. We examine the income for the median family in Vermont and Windham County, which is available only for 2000 to 2005 as of today.

<sup>2</sup> According to the 2000 U.S. Census, about 4,000 of the 23,000 working Windham County residents worked outside the county. Over 1,000 crossed the river into New Hampshire's Cheshire County.

<b>Median Family Income</b>			
	2000	2005	Change
All Vermont	\$46,113	\$52,682	14.2%
Windham County	\$42,045	\$47,773	13.6%

In 2005, the median family income in Vermont was \$52,682, up 14.2% since 2000. In Windham County, the median family income was \$47,773. While it increased at nearly the same rate, 13.6%, since 2000, it was about \$5,000 (or 10%) less than the statewide median. The median family income was the 4<sup>th</sup> lowest of the fourteen counties in Vermont, only above the three Northeast Kingdom counties.

Finally, the U.S. Bureau of Economic Analysis prepares annual estimates of personal income for states and counties. Per capita personal income in Vermont was \$32,717 in 2005. In Windham County it was \$32,058, only 2% less than the statewide average. This is accounted for by the relatively higher amount of dividends and interest earnings plus transfer payments received by Windham County residents (suggesting a large number of retiree residents).

## **B. A Closer Look at the Windham County Economy**

In this section we briefly describe the Windham County economy and present measures of the importance of the VY Station to that economy. The Bureau of Economic Analysis (BEA) publishes estimates of employment (full and part time combined, including the self-employed) for counties. We show nonfarm employment totals below (only 1% of Windham County employees work on farms).<sup>3</sup>

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<sup>3</sup> All data are from the BEA except that for utilities, which is not publicly available. The utility figures are our estimates based on information from Entergy VY and estimates for the small power producer and four owners of transmission lines in the county.

<b>Employment and Compensation by Industry - Windham County 2005</b>					
<b>Industry</b>	<b>Employment</b>	<b>Percent</b>	<b>Compensation in 000s</b>	<b>Percent</b>	<b>Compensation per employee</b>
Nonfarm employment	33,848	100%	\$1,013,014	100%	\$29,928
<i>Utilities</i>	<i>500-999</i>	<i>~2%</i>	<i>~\$50,000</i>	<i>~5%</i>	<i>~\$90,000</i>
Construction	2,672	8%	\$60,608	6%	\$22,683
Manufacturing	2,552	8%	\$131,704	13%	\$51,608
Wholesale trade	1,664	5%	\$77,679	8%	\$46,682
Retail trade	3,686	11%	\$85,591	8%	\$23,221
Real estate and rental and leasing	1,276	4%	\$10,268	1%	\$8,047
Administrative and waste services	1,440	4%	\$27,068	3%	\$18,797
Educational services	2,682	8%	\$68,177	7%	\$25,420
Health care & social assistance	3,595	11%	\$106,958	11%	\$29,752
Arts, entertainment, and recreation	1,009	3%	\$5,530	1%	\$5,481
Accommodation and food services	3,525	10%	\$72,698	7%	\$20,624
Other services, except public administration	1,709	5%	\$25,624	3%	\$14,994
<i>Other private nonfarm employment</i>	<i>3793-4292</i>	<i>~12%</i>	<i>~\$151,284</i>	<i>~15%</i>	<i>na</i>
Government - federal	459	1%	\$23,551	2%	\$51,309
Government - state	284	1%	\$14,383	1%	\$50,644
Government - local	2,503	7%	\$97,891	10%	\$39,109

Based on employment, the Windham County employment is well-balanced, without any heavy concentration in any one sector. There are nine industries with at least five percent of the county's employment. Compensation is not nearly as balanced, with an obvious reliance on manufacturing, health care, and local government for earnings and benefits.

According to 2000 U.S. Census data, Windham County employers drew 75% of their employees from Windham County itself. Another 13% made the trip across the river from neighboring Cheshire County in New Hampshire. A small percentage come from the other three counties that border Windham County: Bennington and Windsor Counties of Vermont and Franklin

County of Massachusetts.<sup>4</sup>

<b>County of Residence of Employees of Windham County Businesses</b>		
<b>County of residence</b>	<b>Number</b>	<b>Percent</b>
Windham County, VT	18,833	74.9%
Cheshire County, NH	3,196	12.7%
Windsor County, VT	759	3.0%
Franklin County, MA	668	2.7%
Bennington County, VT	521	2.1%
Other	1,154	4.6%
<b>Total</b>	<b>25,131</b>	<b>100.0%</b>

Finally, as demonstrated in the chart below, 82% of Windham County residents work in Windham County itself. Only 5% make the trip across the river to businesses in neighboring Cheshire County.

<b>County of Work of Windham County Residents</b>		
<b>County of residence</b>	<b>Number</b>	<b>Percent</b>
Windham County, VT	18,833	82.3%
Cheshire County, NH	1,078	4.7%
Windsor County, VT	740	3.2%
Franklin County, MA	485	2.1%
Bennington County, VT	475	2.1%
Other	1,284	5.6%
<b>Total</b>	<b>22,895</b>	<b>100.0%</b>

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<sup>4</sup> Data on commuting patterns comes from the 2000 US Census and is based on a sample of all those surveyed. Data on employment is from the Bureau of Economic Analysis which comes from state reports. Therefore, the number of commuters in the Census data does not equal the number of workers in the BEA data.

### C. Demographic Changes in Vermont and Windham County

Population data for the state and Windham County is published by the U.S. Bureau of the Census. The last population count was the decennial census in 2000. Population estimates for the years after have been published through 2006 for the counties. Therefore, we review demographic estimates for the years 2000 to 2006.

#### 1. Total Population

From July 1, 2000 to July 1, 2006, the total resident population of Vermont increased from 609,909 to 621,254. This was a gain of 10,869 or just 1.8% over the six-year period. Vermont is one of the slowest growing states in the nation and during this period the annual growth rate steadily declined to just barely 0.1% or less per year.

During the same period, the population of Windham County declined from 44,180 to 43,898. The decline equaled 282 or 0.6% in the six years from 2000 to 2006. Windham County was one of only two counties in Vermont to lose population over the period. (The other was Bennington County.)

#### 2. Working-Age Population

For purposes of this report, we define the working-age population to include residents aged 18 to 64 years old. During the period 2000 to 2006, the Census Bureau estimates that the working-age population of Vermont increased from 384,746 to 407,553, a gain of 6%. All of this occurred from a gain in the number of older workers aged 45 to 64 — the Baby Boom generation. The number of younger workers — aged 25 to 44 — actually declined during this period.

The same trend occurred in Windham County, where the working-age population increased from 27,631 to 28,598, a gain of just 3.5%. As with the state, the gain in the county was only from increased numbers of older workers aged 45 to 64. The number of younger workers aged 25 to 44 declined in Windham County.

### 3. Over 65 Population

Finally, the number of Vermonters aged 65 and older increased from 77,746 to 82,966, a gain of 7% from 2000 to 2006. In Windham County, the number increased from 6,176 to 6,265, a gain of just 1.5%. This population age cohort will grow rapidly in the coming years with the aging of the Baby Boom generation.

Vermont is one of the oldest states in the nation, measured by the median age of its population. In 2006 the median age was 40.4 years, up from 37.8 years in 2000. In 2006 Vermont was the second oldest state in the nation. In Windham County, the median age is significantly higher — 43.2 years in 2006.

### 4. Demographic Summary

Vermont is a slow growing state in terms of population, with very little growth expected for the coming years. The population is aging. While the working-age population is still increasing, that will soon slow and then begin declining (by 2012 is the forecast) as the Baby Boomers retire. Windham County is losing population and will continue to do so for the foreseeable future. It's workforce will soon begin to decline as well.

From an economic perspective, a declining population generally means a declining demand from the regional market for goods and services. A declining labor force means that it will be increasingly difficult for employers, particularly for those serving the broader U.S. or global market, to find the labor needed to operate efficiently in Windham County.

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### III. Importance of the VY Station Today

This analysis will measure the impact of the VY Station's operation on the Windham County and Vermont economies in the future, while the plant operates and is eventually decommissioned. The impact is significant. We briefly show why that is the case by presenting the VY Station's direct and indirect impact on the economy today. This sets the stage for understanding the future impacts of the VY Station.

#### A. The VY Station's Employment and Total Wages Today

The VY Station's operations are located entirely in Windham County in southern Vermont. Entergy VY operates its nuclear power station in Vernon and a small training center in Brattleboro. In addition, Entergy VY contracts out for some maintenance services, security services, and food services with local firms which, from an economic perspective, adds to its total employment. Lastly, the nuclear power plant routinely shuts down for refueling. This occurs about every 18 months and brings in a large number of outside employees who are specialized in this process. The total employment and wages of the VY Station is the sum of the company's employment and wages, the on-site contracted employment and wages, and the periodic outage employment and wages. Because the potential impact from the outages is relatively small compared to the impact from the other employment, we exclude it from this analysis.<sup>5</sup> The number and size of the payroll for the other two activities follows.

- The VY Station Employment - In 2007 the VY Station had 454 employees working at the power station and training center combined. In that year Entergy VY paid \$55,584,204 in wages and bonuses. Because the previous year (2006) was an exceptional year for the performance of the power station, bonuses paid in 2007 were larger than normal. The average wage and bonuses paid by VY Station for years 2004 to 2007 equaled \$53,467,000.<sup>6</sup>
- Contracted Employment - In 2007 the contracted employment at the VY Station equaled 169 people.

The importance of the VY Station in the county's economy is demonstrated by the fact this one firm directly accounts for 2% of the employment and about 5% of the compensation earned in

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<sup>5</sup> It should be noted, however, that the influx of outage workers for several weeks every 18 months does result in tangible short-term benefits for many local businesses, particularly in the restaurant and accommodations industries.

<sup>6</sup> The past wages were adjusted for wage inflation of 4% per year and then averaged to yield this figure.

Windham County. The VY Station’s compensation per employee is higher than that of any industry in Windham County. In addition, the Vermont Department of Labor reports that the VY Station is one of the top five single employers in Windham County.

**B. The VY Station’s Impact on Windham County’s Economy Today**

Based on the above information we estimate the impact of the VY Station on Windham County’s and Vermont’s economy. We exclude the expenditure impact from the temporary employees associated with the refueling outages. In addition, we exclude any impact associated with the loss of power produced by the VY Station and the subsequent price impacts to replace that power.

The impact of the VY Station on the county and state economy is much greater than that due solely to its own payroll and that of its on-site contractors. That is because much of the nearly \$53 million in payroll is spent locally and elsewhere in Vermont at other businesses, thereby creating additional jobs and additional payroll. This is known as the multiplier process in economics. By use of a dynamic input-output model we estimate the following impact of the VY Station on the state and county economy.<sup>7</sup>

<b>Total Economic Impact of the VY Station in 2008</b>			
	<b>Jobs Created</b>	<b>Increased Wages (millions of 2008 \$)</b>	<b>Increased Disposable Income (in millions of 2008 \$)</b>
Windham County	1,034	\$80.8	\$61.9
Rest of Vermont	220	\$8.7	\$13.3
<b>Total Vermont</b>	<b>1,254</b>	<b>\$89.5</b>	<b>\$75.2</b>

- The total number of jobs created in Windham County in 2008 due to the presence of the VY Station equals 1,034 (of which 623 are Entergy VY employees plus contract employees). These jobs include 55 in retail trade, 58 in construction, 43 in accommodations and food services, 42 in health care and social assistance, and 44 in professional services among other jobs.

<sup>7</sup> The model is described in the Appendix to this report.

- Elsewhere in Vermont an additional 220 jobs exist today due to the VY Station's presence in Windham County. These jobs include 36 in retail trade, 22 in construction, 23 in accommodations and food services, 28 in health care and social assistance, and 23 in professional services among other jobs.
- The total number of jobs created in the state of Vermont by the VY Station's 623 jobs (at the plant and through contractors) equals 1,254. This implies an employment multiplier of 2.01. This relatively large multiplier is due to the high wages at the power station itself which generates the large multiple impact. (Note: additional jobs are created across the New Hampshire and Massachusetts borders, but are not counted in this figure.)
- The total payroll at all Vermont employers due to the presence of the VY Station equals \$89.5 million (in 2008\$). The total payroll at all Windham County employers equals \$80.8 million. Payrolls at employers in the rest of Vermont equals an additional \$8.7 million due to the VY Station.
- Finally, disposable income of all Vermont residents is \$75.2 million higher than otherwise due to the presence of the VY Station. Disposable income of Windham County residents is \$61.9 million higher. Elsewhere in the state, disposable income is \$13.3 million higher due to the VY Station.

In summation, the operation of the VY Station in Vernon has a large and positive economic impact on Windham County and the rest of Vermont in 2008.

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## IV. Economic Activity with the VY Station Relicensing

In this section, it is assumed that the VY Station is relicensed and continues operating as is does today through the year 2031.<sup>8</sup> The plant is then decommissioned over the period 2032 to 2040. From 2042 to 2082 spent fuel is gradually removed from the site. In 2083 any remaining infrastructure is removed, site restoration is complete, and no activity or structures associated with the VY Station remain.

The economic activity during the operation of the VY Station through 2031 is estimated by assuming the current level of employment and wages (adjusted for real wage growth) at the VY Station is increased slightly as planned by Entergy VY. That is, employment at the power station rises to 514 with a proportional increase in payroll. Contract employment falls to 150 from 169 with a proportional decrease in payroll. Then from 2032 through 2083 the economic activity is measured by use of the annual expenditures presented by TLG Services, Inc.<sup>9</sup>

This scenario covers the period from 2012 through 2083, a period of 71 years. The ReDyn model allows estimation from 2012 to 2055. The activity at the VY Station during the period 2056 through 2083 is little changed from 2041 to 2055, so our estimate for that period is simply an extrapolation from the earlier period, with the exception of 2082.

The estimated future employment and wages of Windham County under this scenario is presented in the following graphs.

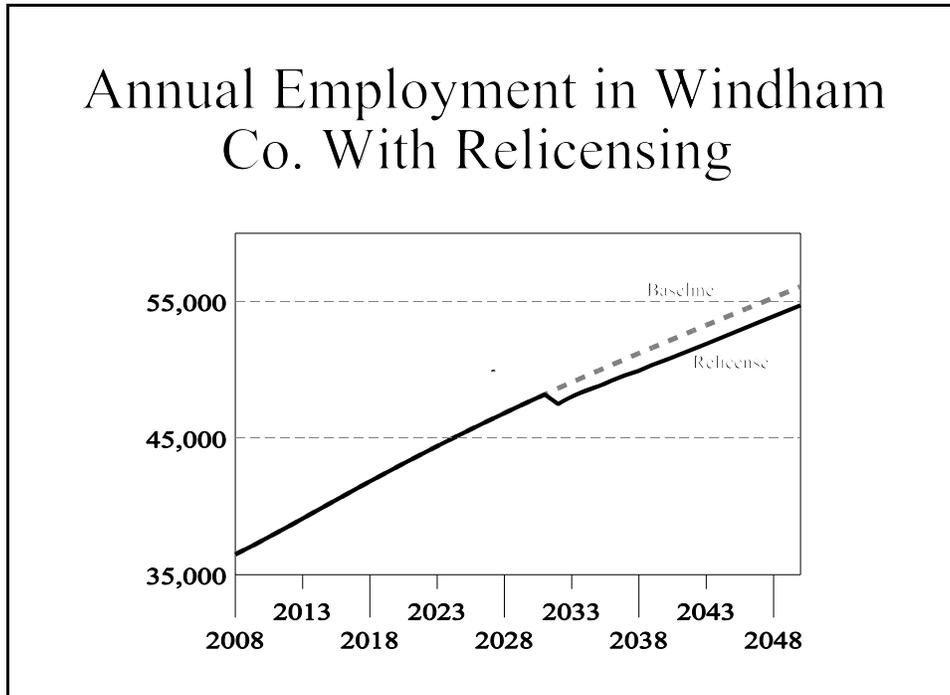
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<sup>8</sup> The ReDyn model which is used to estimate economic impacts is based on calendar year periods. Therefore, although a twenty year extension of the VY Station's license would allow it to operate from March 2012 until March 2032, for the purposes of this analysis it is best to assume it operates from 2012 to 2031 and ceases operations in 2032.

<sup>9</sup> See the report "Decommissioning Cost Analysis..." prepared by TLG Services, Inc., dated January 2007. This section uses the estimate in Table 3.4.

**A. Windham County Employment with Relicensing**

The level of employment in Windham County over the period 2012 to 2050 is presented in the graphic below.<sup>10</sup>



Generally, employment is forecasted to steadily, but slowly, increase over the entire period.<sup>11</sup> After 2031, the VY Station ceases operating as a power plant. The employment associated with this operation is lost to Windham County and we see an immediate, large decrease in employment. This decrease is somewhat moderated by the expenditures at that time for decommissioning the plant but not by enough to prevent a significant decline. The decommissioning continues through 2040, with a declining need for employees in the later years.

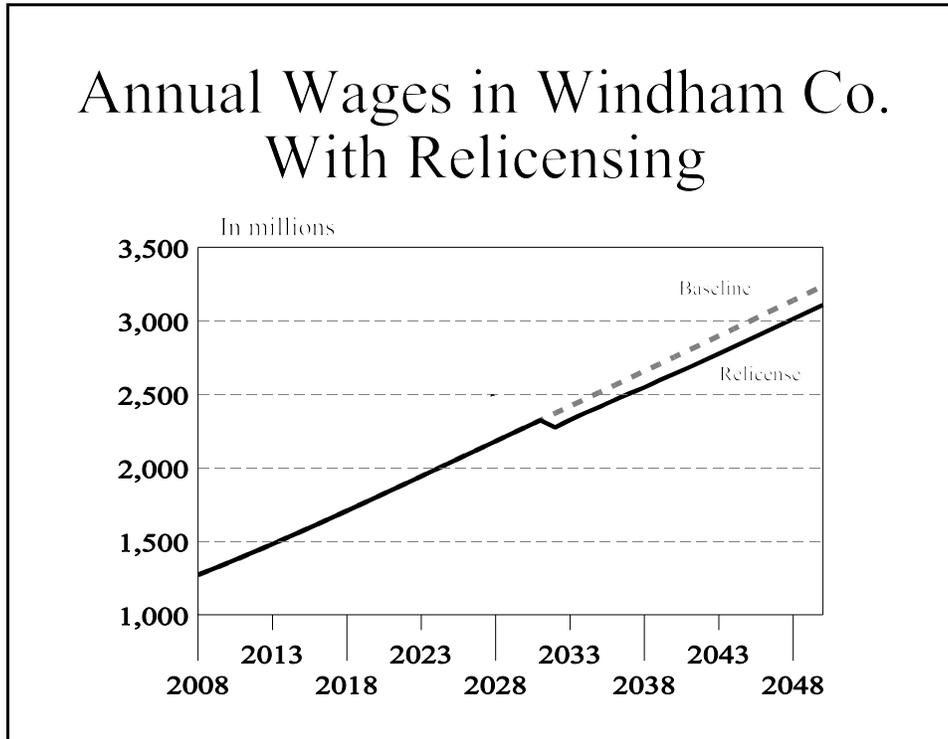
The baseline estimate for employment in Windham County is shown by the dashed line. It is based on the assumption that the VY Station would continue to operate indefinitely into the future.

<sup>10</sup> Estimates were carried out through 2083, but the important differences between the two scenarios occur from 2012 through about 2050.

<sup>11</sup> The baseline is the forecast for the county as prepared by the ReDyn model. It is a more optimistic forecast than we would prepare. That, however, does not matter to this analysis as we are concerned about the difference in the impacts to the regional economy under two scenarios. The difference in the impacts would be virtually identical if a less optimistic forecast was prepared as the baseline.

**B. Windham County Total Wages with Relicensing**

The total wages paid by employers in Windham County over the period 2012 to 2050 is presented in the graphic below. Total wages follow the same path described above for employment.



Total wages paid in Windham County increase steadily through 2032, then fall with the decommissioning of the plant. The immediate decrease in wages from ceasing operation of the plant is offset somewhat by the wages paid for decommissioning the plant. By 2040 the plant has a very small impact on wages in the county as decommissioning is complete and activity at the plant is very limited.

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## V. Economic Activity with the VY Station 2012 Shutdown

In this section, it is assumed that the VY Station ceases producing power in the year 2012 when its current license expires.<sup>12</sup> The facility is placed and maintained in a condition that allows the nuclear facility to be safely stored and subsequently decontaminated, a condition referred to as SAFSTOR. This continues until 2032 when the plant begins to be decommissioned, the current estimate of the earliest date for that to occur.<sup>13</sup> Decommissioning ends in 2039. Spent fuel is gradually removed from the site through 2043.<sup>14</sup> And in 2043 any remaining infrastructure is removed, site restoration is completed, and no activity or structures associated with the VY Station remain.

The economic activity from 2012 through 2043 in this scenario is measured by use of the annual expenditures developed by TLG Services, Inc.

The estimated future employment and total wages of Windham County under this scenario is presented in the following graphs and tables.

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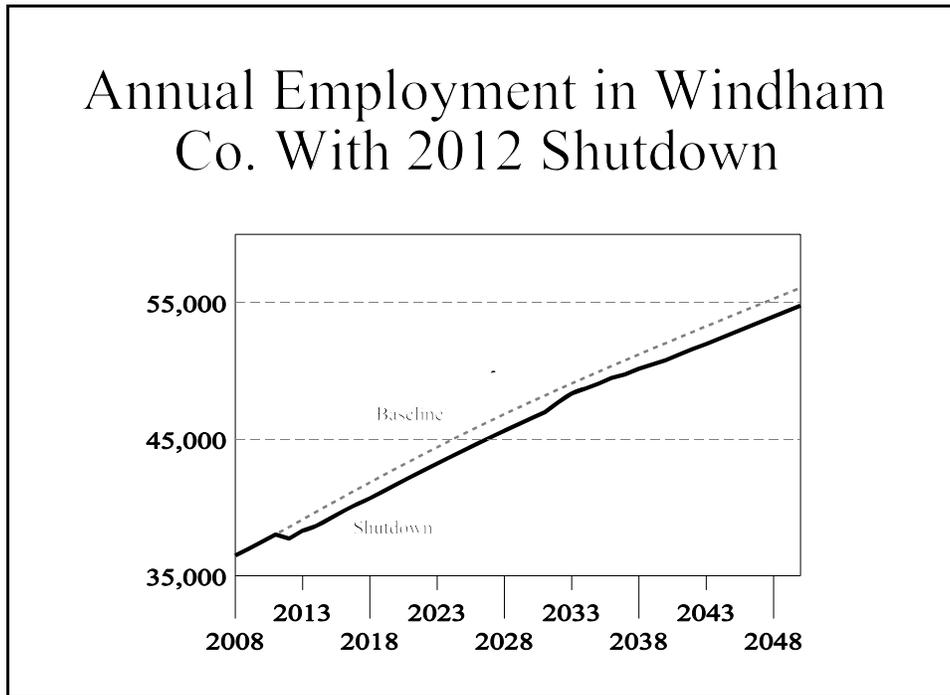
<sup>12</sup> With this estimate we assume the VT Station stops producing power at the end of 2011 instead of March 2012. This is because the ReDyn model is based on calendar year periods.

<sup>13</sup> We were asked to utilize a 2032 date for the commencement of decommissioning because we understand that the 2032 date is consistent with the implementation of SAFSTOR and an annual rate-of-return of 6.3% on the Vermont Yankee decommissioning trust fund, which we understand is the actual, after-tax rate-of-return on the fund since 2002.

<sup>14</sup> The continue-to-operate scenario assumes that the spent fuel is removed from the VY Station in 2082, while this scenario assumes a 2043 date for removal of the spent fuel by the U.S. Department of Energy. We understand that the 2043 date reflects the earliest date that Entergy VY would expect the spent fuel to be removed from the station, and this date is referenced in two scenarios in TLG's Decommissioning Cost Analysis report. For the purposes of our analysis, whether the spent fuel is removed in 2043 or 2082 makes little difference to the economic impact of a 2012 shutdown since, as explained below, the significant economic impact of a 2012 shutdown occurs prior to 2043.

**A. Windham County Employment with 2012 Shutdown**

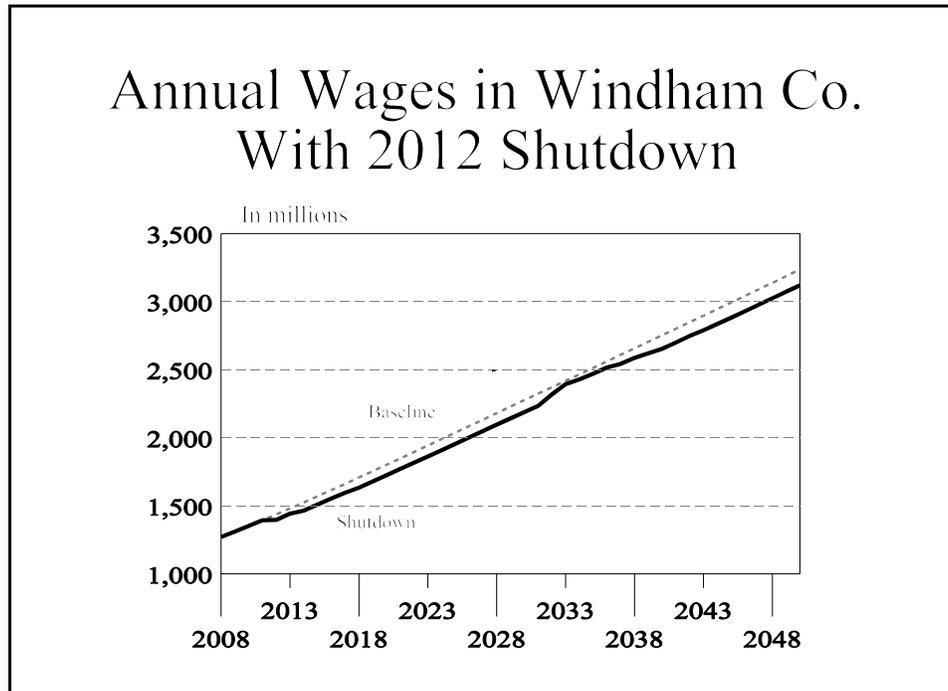
The level of employment in Windham County over the period 2012 to 2050 is presented in the graphic below.



- In 2012 there is a loss of jobs in Windham County when the VY Station ceases producing power. The job decline is somewhat offset by the jobs needed at the power station to put it into SAFSTOR mode.
- Jobs resume growing after 2012 but at a lower trajectory than indicated by the baseline estimate. This is because the number of jobs needed for the conversion to SAFSTOR rapidly decreases.
- Job growth increases somewhat in 2032 as decommissioning of the plant begins. The expenditure for decommissioning decreases in 2037 and ends in 2039.

## B. Windham County Total Wages with 2012 Shutdown

The total wages paid by employers in Windham County over the period 2012 to 2050 is presented in the graphic below. It follows the same path as the employment described above.



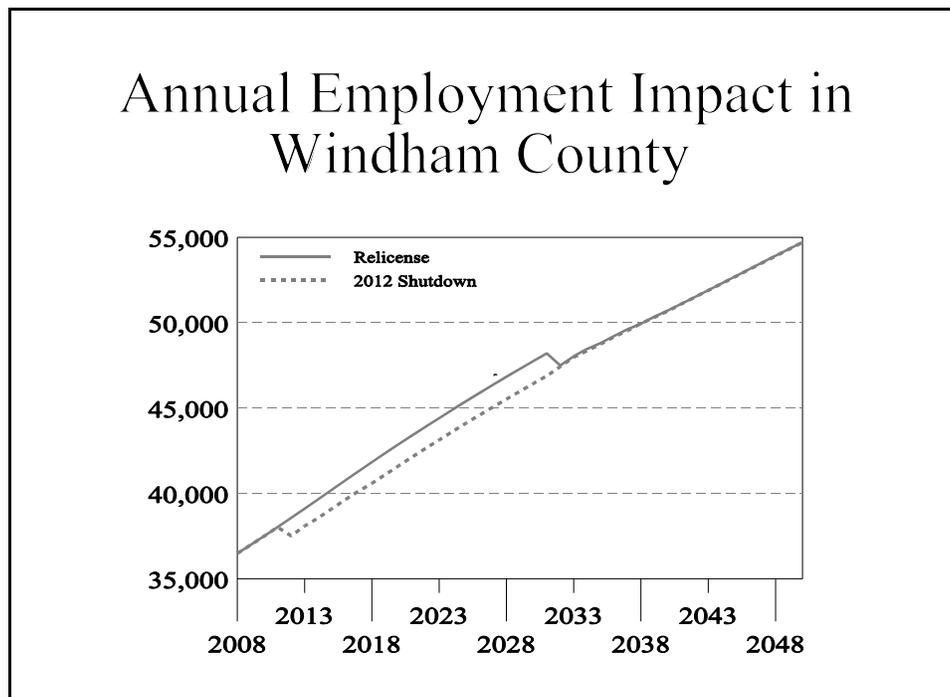
- In 2012 the total wages at Windham County employers drop off from the baseline estimate. This is because the VY Station has ceased producing power and the payroll from that activity ceases. The payroll is partially offset by the payroll associated with preparing the plant for SAFSTOR mode, but not enough to prevent a decline.
- Payroll in the county grows after 2012 but at a more sluggish rate than with the baseline estimate as the work associated with the SAFSTOR conversion declines and ends by 2017.
- Payroll growth picks up in 2032 under this scenario as the decommissioning of the plant begins. Considerable wages are generated from decommissioning through 2039.
- After 2040, payroll again drops off as limited activity at the site continues only until 2043.

## VI. Economic Impact of Relicensing Versus 2012 Shutdown

The economic impact of extending the VY Station’s operating license for twenty additional years versus requiring it to cease operations is measured by comparing the estimated employment, wages, disposable income, and other variables under these scenarios.

### A. Employment Impact in Windham County

The employment impact from 2008 through 2050 can be seen in the diagram below. There is very little net impact after 2050, and most of the impact occurs during the period 2012 through 2032. Therefore, we present just the 2008 to 2050 period in the graph below.



There is no difference between the relicensing or the shutdown scenario until 2012. Then, under the shutdown scenario, power generation ceases. The employment loss is partially offset by the expenditures to put the plant in SAFSTOR mode, but it is still visible in the graph. Those expenditures end in 2018. From then until 2032 the employment difference is the largest because the comparison is between an operating plant and essentially a “mothballed” plant. On average, from 2012 to 2031 Windham County would have 1,232 fewer employees under the shutdown scenario than with the relicensing scenario.

**B. Total Wage Impact in Windham County**

The total wages paid by Windham County employers will be significantly less in the shutdown scenario than with the relicensing scenario. Almost all the difference occurs during the 2012 to 2032 period.

In the relicensing scenario, the simple sum of the total wages (in constant 2008 dollars) paid by Windham County employers equals \$110,814 million. In present value terms, as of today, this totals \$64,018 million.<sup>15</sup>

In the shutdown scenario, the simple sum of the total wages paid by Windham County employers equals \$108,649 million. In present value terms this equals \$62,480 million.

The difference in the wages paid between these two scenarios equals \$2,165 million over the period 2012 to 2050. In present value terms this equals \$1,538 million.<sup>16</sup>

<u>Scenario</u>	<u>Simple Sum</u>	<u>2008 Present Value</u>
Relicense	\$110,814	\$64,018
Shutdown	\$108,649	\$62,480
Difference	\$2,165	\$1,538

**C Income Impact on Windham County Residents**

Wages paid at area businesses do not necessarily equate to income earned by area residents. A number of workers of Windham County businesses live out of the county (and out of state). In addition, income is derived from a variety of sources in addition to wages. Therefore, we are concerned not only with the payrolls of local businesses but also with the disposable (after tax) income of local residents.

Over the period 2012 to 2050, the disposable income (in 2008 dollars) earned by Windham County residents in the relicensing scenario totals \$2,392 million more than in the shutdown scenario. In present value terms this equals \$1,695 million.

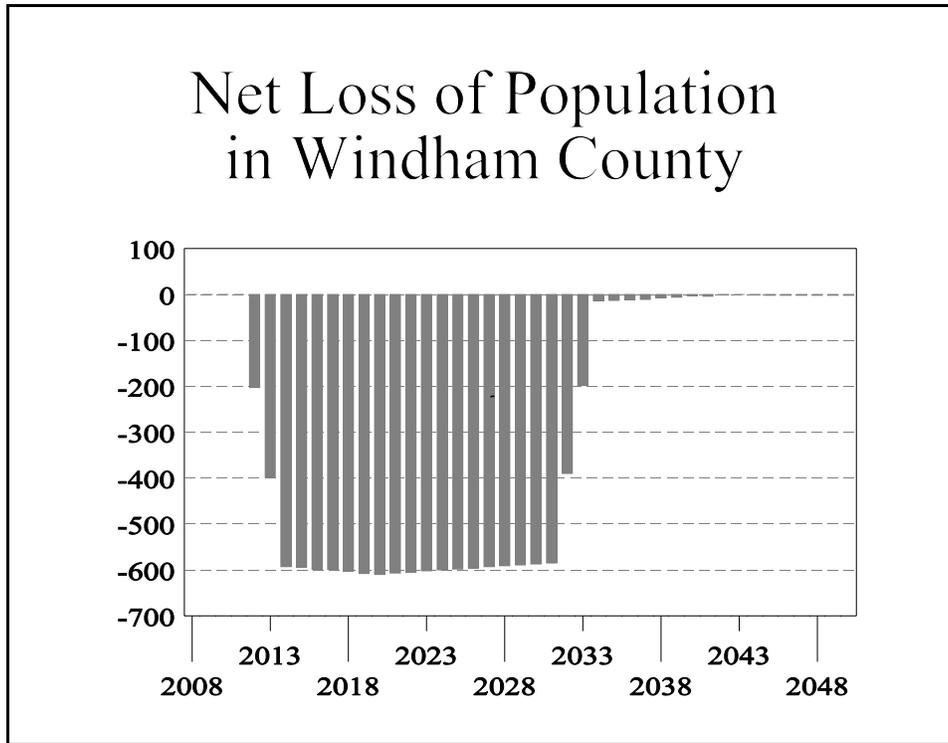
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<sup>15</sup> We use a nominal interest rate of 5%. The real interest rate we estimate to be 2.5% (implying inflation of nearly 2.5%). We note that the current return on 20-year U.S. Treasury securities equals 4.40%.

<sup>16</sup> If a discount rate of 4% were used instead of 5%, the present value of the difference would equal \$1,757 million. If a 6% rate was used, the present value would equal \$1,353 million.

**D. Demographic Impact on Windham County**

With the estimated loss of jobs in Windham County under either the relicensing or shutdown scenarios, population will follow those jobs. The graph below depicts the estimated net loss of population in Windham County during the period 2008 through 2050. This is the difference in the county’s population under the relicensing scenario versus the 2012 shutdown scenario.



There is no net loss of population until 2012. The 2012 shutdown leads to a loss of 203 residents in 2012 which rises to a net loss of 599 by 2017.<sup>17</sup> The loss changes over time as the nature of the process of putting the plant in SAFSTOR mode moderates the loss and people move to new locations with some lag time. From 2018 to 2031 the population loss is around 600 people, about half are working-age (25 to 64) residents. Beginning in 2032 this net loss then falls as Entergy VY begins decommissioning of the plant under the relicensing scenario. By 2035 there is no significant net population loss.

<sup>17</sup> This is the net loss. In 2012 the net loss is 203 residents. In 2013 the net loss is 398. That is, in 2013 another 195 residents leave the county and bring the net total to 398. The loss is not the sum of 203 and 398.

### **E. Employment Impact in the Rest of Vermont**

Most of the impact of the VY Station occurs within Windham County. However, some impact spills over into Bennington, Windsor, and other counties in the state (as well as into New Hampshire and Massachusetts). As measured in section III of this report, the VY Station led to the creation of an additional 222 jobs and an additional payroll of \$8.8 million elsewhere in Vermont in 2008. A similar spillover into the rest of Vermont will be felt in the future with the VY Station under the two scenarios being considered in this report.

Employment in the rest of Vermont is lower under the shutdown scenario than relicensing scenario. There are between 286 and 322 fewer jobs in Vermont outside of Windham County during the period 2012 to 2017 with the early shutdown than with the relicensing. Then from 2018 to 2031, when the comparison is between an operating plant and a plant in SAFSTOR, the rest of Vermont will see between 337 and 377 fewer jobs. After 2032, the job difference is 20 or less. Over the entire period 2012 to 2031, employment averages 342 less with the shutdown scenario than the relicensing scenario.

### **F. Total Wages and Disposable Income Impact in the Rest of Vermont**

In the rest of Vermont the total wages paid by employers is lower with the 2012 shutdown than with the relicensing. The difference in the total wages equals \$343 million over the period 2012 to 2050. In present value terms this equals \$241 million.

Disposable income earned by residents in the rest of Vermont is also lower in the 2012 shutdown scenario than in the relicensing scenario. The difference in disposable income earned by residents of the rest of Vermont equals \$523 million over the period 2012 to 2050. In present value terms this equals \$369 million.

### **G. Population Impact in the Rest of Vermont**

With the loss of jobs in the shutdown scenario versus the relicensing scenario, there is a corresponding net loss of population. Practically all the net population loss in the rest of the state occurs from 2012 to 2032 with the shutdown scenario as compared to the relicensing scenario. The net loss ranges from 117 to 127 people during the period 2014 to 2031.

**H. Tax Revenue Impacts on State Government**

When economic activity slows, state government tax revenues slow as well. This is true for individual income taxes, general sales taxes, and most other taxes. By use of the ReDyn model we estimate the net reduction in state taxes due to the difference between those revenues received under the relicensing scenario versus the 2012 shutdown scenario.

Net Loss in State Tax Revenues 2012 to 2050 (in millions of 2008 dollars)		
<u>Source</u>	Simple <u>Sum</u>	2008 Present <u>Value</u>
All state taxes	\$313.0	\$221.6
Individual income	\$84.1	\$59.5
Property	\$80.5	\$57.0
Selective sales	\$73.2	\$51.8
General sales	\$44.3	\$31.3

These taxes received are the consequence of either the operation of the VY Station or from the economic activity created through the multiplier process. For example, the income taxes are paid by both the VY Station employees and by employees of other businesses in the state that exist because of the presence of the VY Station in Vermont.

Over the period 2012 through 2050 the sum of all taxes paid to the State of Vermont is \$313.0 million less under the 2012 VY Station shutdown scenario than under the relicensing scenario. In present value terms this difference equals \$221.6 million.

The four largest tax sources are individual income taxes, property taxes, selective sales taxes and general sales taxes.<sup>18</sup> The net loss to the state treasury in present value terms from these tax sources equals \$59.5 million, \$57.0 million, \$51.8 million, and \$31.3 million, respectively.

These estimates do not include one special tax that Entergy VY pays to the state of Vermont. The Electrical Energy Tax which was restructured in 2004 into the current generation tax is based on the megawatt hours of electricity produced by the facility. In 2006 Entergy VY paid \$2.6 million to the state under this tax. This payment would not continue under the shutdown scenario. Over the twenty year period of relicensed operations, the state would receive more than \$50 million in additional revenues from this tax that it would lose with the 2012 shutdown of the plant.

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<sup>18</sup> Selective sales taxes includes a wide variety of specific taxes levied on sales, including motor fuel, tobacco, alcoholic beverages, etc.

**I. Revenue Impacts on Local Governments**

Just as the state will see a fall in tax revenues from the reduction of economic activity, so will the many local governments in Vermont. The single largest tax source to local governments in Vermont is the property tax and that accounts for most of the tax reduction. The net loss of local tax revenues is difference between the local tax payments under the relicensing versus 2012 shutdown scenarios.

The net loss over the period 2012 to 2050 equals \$92.1 million (in 2008 dollars). In present value terms this equals \$65.2 million.

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## Appendix I - Methodology of this Analysis

The economic, demographic and fiscal impact of the future operation and eventual decommissioning of the VY Station is measured by use of a dynamic, input-output model developed by Regional Dynamics Inc. (“The ReDyn Model”). This model allows the estimation of economic, fiscal and demographic impacts from 2008 through 2056.

Regional Dynamics is an economic modeling company. ReDyn offers an advanced economic model by web subscription or batch services to consultants, agencies, firms, planners, and analysts (users). ReDyn runs on the Internet. The model estimates the multi-regional impacts and year-by-year (dynamic) nonlinear effects on industries, consumers, and governments from changes in company sales, jobs, wages, or investments; changes in taxes or personal or government spending; or public policy changes such as energy, environment, school, health, or security measures. The results are called simulation forecasts, or simulations.

The model is a fundamental re-envisioning of economic theory applied to estimating multi-regional, dynamic effects. It reflects advances in New Economic Geography, especially gravity theory (regional attraction) and trade flow (regional imports/exports), based on a new distance impedance database from Oak Ridge National Laboratories that enables calculating trade flow by commodity by road, rail, water, air, and proxy transport. The breakthrough in design is the commodity production linkage between the trade flow process and an entity-based data structure for the economy. Entities include industries, workers, governments, investors, etc., and commodities are the goods they use and make.

ReDyn is more flexible, complete, and accessible than any other modeling process available today.

For this report we developed a four region ReDyn model. The regions are: Windham County, the remaining counties of Vermont (called “Rest of Vermont”), Cheshire County in New Hampshire, and Franklin County in Massachusetts. The economic impacts on the latter two counties are not of concern to this report. However, they were included in this analysis in order to fully measure the impact of the VY Station and increase our confidence in the reasonableness of the ReDyn model’s estimates.