



FACTS VERMONT

A M E R I C A N S E C U R I T Y P R O J E C T

Pay Now, Pay Later: Vermont

Vermont's average temperature is expected, under a business-as-usual scenario, to rise 4-5°F by 2100, which would significantly reduce the length of the sap tapping season and damage the \$32 million maple syrup industry.¹ This will also likely harm the booming dairy industry, jeopardizing production of Ben and Jerry's ever-popular Cherry Garcia, Phish Food, and Fossil Fuel ice creams, to name a few.²

Vermont's numerous ski resorts will be subjected to shorter winters. Increased operating costs and expenses associated with the need for more artificial snow will reduce the profitability of the \$750 million industry, which has already considerably increased snowmaking efforts, expanding the area covered by man-made snow by over 15% between 1997 and 2009.³

Vermont has distinguished itself as a leader in efforts against climate change through participation in the Regional Greenhouse Gas Initiative (RGGI), a market-based approach to reducing the power sector's carbon emissions 10% by 2018.⁴ In just one auction, the RGGI brought in over \$106 million for participating states to spend on clean energy and efficiency projects.⁵

According to a new study, a failure to mitigate the effects of climate change could begin to cause serious gross domestic product and job losses within the next several decades. Between 2010 and 2050, it could cost Vermont \$700 million in GDP and over 5,000 jobs.*

**GDP numbers are based on a 0% discount rate. Job losses are measured in labor years, or entire years of fulltime employment. Backus, George et al., "Assessing the Near-Term Risk of Climate Uncertainty: Interdependencies among the U.S. States," Sandia Report (Sandia National Laboratories, May 2010), 141. https://cfwebprod.sandia.gov/cfdocs/CCIM/docs/Climate_Risk_Assessment.pdf (accessed March 23, 2011).*

Admittedly, the effects of climate change, a complex and intricate phenomenon, are difficult to predict with precision. Informed scientific and economic projections, as we have used in our research, however, allow us to see that Vermont faces significant losses in industries crucial to its economy if no action is taken.

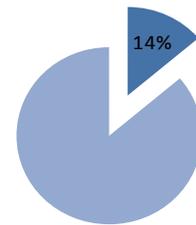
Moreover, data shows Vermont is poised to benefit from the research, development, and distribution of renewable energy technologies. Vermont has shown that it is an innovative state, dedicated to reducing greenhouse gas emissions through projects such as the "Cow Power Program," where animal waste is used

to power homes across the state.⁶ Over 4,600 customers have signed up so far, yet the number of participating farmers is fewer than needed to meet the actual demand.⁷ Should we fail to take action against climate change, Vermonters have much to lose.

Pay Later: The Cost of Inaction

As a result of climate change and its associated effects, Vermont's economic security will be compromised. Its famous maple syrup, dairy, and tourism industries have much to lose if climate change goes unmitigated.

Vermont's Labor Force Projected to be Directly Affected



Source: Bureau of Economic Analysis⁸

A Sticky Situation

Forests cover over 78% of Vermont's landscape, and forest related manufacturing, recreation, and tourism contribute over \$1.5 billion to the state's economy.⁹ Especially vulnerable, under both high and low emissions scenarios, are the spruce and fir forests, as they require the lower temperatures. These iconic forests are home to the Canada lynx, snowshoe hare, and Bicknell's thrush, all of which contribute to the state's unique ecosystem. The maple, beech, and birch forests are also vulnerable. Under a high emissions scenario, by late century, Vermont's temperatures could increase by as much as 9-13°F and 7-14°F above historic seasonal levels, in winter and summer, respectively. The increase would be halved under a low emissions scenario.¹⁰ The trees would likely shift northward eventually, perhaps largely exiting the region.¹¹

Throughout New England, this trend has already been seen in some tree species, which have moved uphill, to colder elevations, by roughly 350 feet in response to the 2-4°F increase in temperature over the past 40 years. Trees which thrive in warmer climates increased from 57% to 82% throughout the region, and have begun to crowd out native trees like the sugar maple; cold-climate trees have decreased from 43% to 18% in these areas.¹²

As temperatures continue to rise, sap production will deteriorate.¹³ Vermont has long been the top producer of maple syrup in the United States. **In 2010, the state accounted for 46% of the market in the nation, generating over \$32 million in revenue the year prior.** For the maple syrup industry, the 2010 season was one of the worst years on record in both quantity and quality across the entire region, producing 10% less than in 2009. The season started and ended earlier than usual and temperatures warmed too quickly, with too few nights of freezing temperatures, for optimal sap flow.¹⁴

These trends, as they adversely affect the state's forests, could also hurt the tourism industry. Many visitors come to Vermont each year to see the colorful fall foliage. **In autumn 2007, 3.7 million visitors spent \$375 million to experience Vermont's fall beauty, patronizing its associated industries such as lodging and restaurants.**¹⁵

A Dire Situation for Dairy Farmers

The dairy and cattle industry generates over 75% of the gross farm income in Vermont.¹⁶ Cattle begin to feel heat stress at 77°F and become more uncomfortable as heat

and humidity increase. Cattle under heat stress produce less milk and fewer offspring.¹⁷ The average temperature

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for July across Vermont in 2010 was 70.4°F.¹⁸ If predictions are correct, this average will rise, perhaps reaching up to near 82°F by the end of the century,¹⁹ with correlating decreases in milk production and reproduction rates, leaving dairy farmers to face significant losses.²⁰ **The dairy and livestock industry already loses \$5.4 million annually due largely to increased temperatures, and losses will likely increase as they continue to rise.**²¹

Wintertime Blues

Winter activities are a cultural tradition for Vermonters and a major source of tourism. In 2009, skiing and its related industries brought in \$750 million in direct spending to the state's economy.²² Much of tourism taxes and fees—\$206.9 million in 2007—are used for education (\$82.9 million). Over a third of the 14.3 million visitors who traveled to Vermont in 2007 did so during ski season.²³ Winter precipitation will increasingly fall as

rain, decreasing the viability of the skiing and snowboarding industries.²⁴ Warmer winters will shorten the ski and snowboard season and increase the need for artificial snowmaking, a costly practice that requires significant amounts of water and energy. Vermont's snow season will, under a high emissions scenario, be halved by late century. Snowmobiling may by mid-century become completely unviable throughout most of the Northeast, as could other activities that rely on natural snowfall like cross country skiing and snowshoeing, as it is impractical and too costly to make snow on these paths. Vermont stands to lose millions, if not billions, in tourist revenue.²⁵

Pay Now: The Benefits of Taking Action

Vermont has dedicated itself to maintaining its reputation as the “green state.” It is one of only two states in the country with no coal-fired plants, and generates about three-fourths of its electricity from nuclear power plants, a higher percentage than any other state. In 2008, Vermont announced its goal to produce 25% of its power from renewable sources by 2025, once again establishing itself as a leader in the fight against climate change.²⁶

The Regional Greenhouse Gas Initiative (RGGI), an agreement between 10 Northeastern states to cut carbon emissions 10% by 2018, went into effect January 1, 2009.²⁷ This agreement implements a cap-and-trade program to be used throughout the region. **By developing the RGGI, Vermont has established itself as a leader in the fight against climate change, while demonstrating the opportunity to generate profits**

at the same time it increases environmental responsibility. The December 2008 carbon allowance auction generated over \$106 million for participating states, which was divided and used for clean energy and efficiency projects in each state. Vermont garnered \$1.3 million from the first two carbon auctions, in a quarterly series.²⁸

The Green Mountain State's landscape is ideal for the placement of wind farms. Although Vermont has only one wind farm now, it powers about 2,000 homes in southern Vermont.²⁹ Vermont could produce up to 10% of its electricity from only 152 wind turbines. **The development of these wind farms would stimulate the state's economy, with an estimated \$152 million spent on Vermont's goods and services. Wind farms would annually pay \$5.6 million to homeowners and the state in the form of local lease payments and taxes.**³⁰

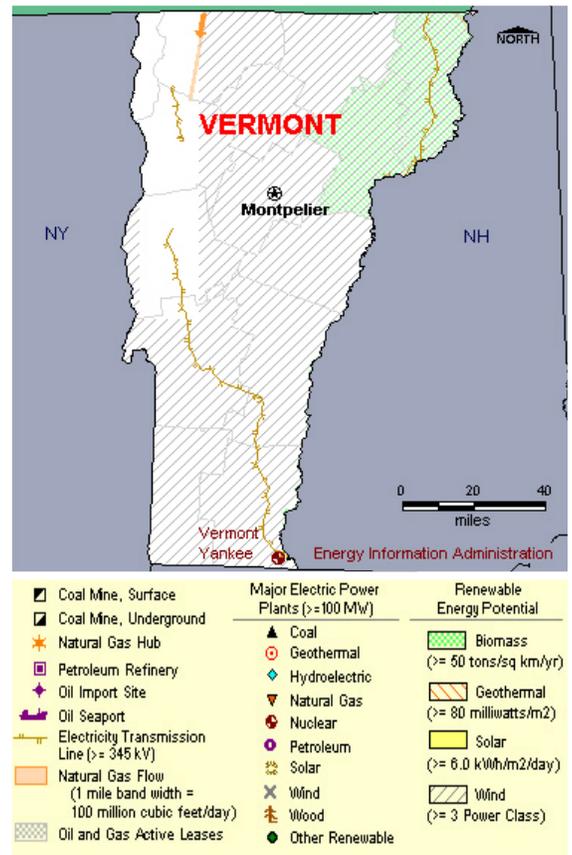
Biomass is also an important source of energy for Vermont. During the 2001-2002 school year, 10% of the public schools in the state were heated by biofuel. Vermont is rich in the inexpensive waste woodchips³¹ that are used for this purpose. Over a 15-year period, the price of woodchips increased less than 1% per year, from \$25 to \$28 per ton.³² Currently, only 7% of Vermont's biomass heating needs are met through in-state sources. **If Vermont's biomass capacity is doubled to 14%, then Vermonters could cease sending over \$100 million out of state each year in imported fuel; instead, it could generate \$200 million in in-state activity.**³³

Vermont has also developed a program that utilizes methane rich manure. Consumers can now choose to get a quarter, half, or all of their electricity from cow manure. This animal waste is sequestered, the methane captured, and then used to power electrical generators. Farmers who sell their manure to the program are paid 95% of the market sale price while consumers pay a 4-cent premium on each kWh used³⁴ (roughly \$20 per month for the typical customer).³⁵ **Cow Power also helps farmers offset the volatile price of milk by offering a steady income stream. Additionally, the program improves air and water quality while reducing manure odors and greenhouse gas emissions.**³⁶

Conclusion

Vermont must consider action on climate change not just in terms of cost, but also in terms of opportunities. If we give Vermont's population, businesses, and investors clear and consistent signals by properly offering initiatives and cultivating demand, investment and innovation in renewable technologies will follow.

Vermonters will have to pay for the effects of climate change. The only remaining question is whether they will pay now, or pay later and run the risk of paying significantly more.



(Endnotes)

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