

Vermont Genuine Progress Indicator 1960-2011

Findings and Recommendations

Jon D. Erickson, Eric Zencey, Matthew J. Burke,
Sam Carlson, and Zachary Zimmerman

Gund Institute for Ecological Economics
University of Vermont

July 30, 2013

Vermont is leading the nation in the development, adoption, and implementation of new indicators that guide genuine economic progress. A central policy challenge is that economic benefits are often privately captured, market-based, and short-term, and thus relatively easy to count and guide decisions. However, many of the costs of economic activity are often borne by the general public, non-market, and long-term. To move towards full cost accounting and more informed policy-making, the Genuine Progress Indicator (GPI) was developed to measure the long-term, net benefits of economic activity. This summary reports on the 2011 estimate of Vermont GPI, trend analysis from 1960, and key findings among the economic, environmental, and social components. Recommendations are summarized for future improvements to GPI and policy application. A full technical review of the 26 components to GPI is available in a separate report.

BACKGROUND

The global economic recession of 2008-2012 renewed a decades-old debate on how to measure the genuine progress of an economy. For nearly 70 years, economic recessions and expansions have been measured by Gross Domestic Product (GDP) – the total economic output of an economy measured as the sum of household, business, government, and net export expenditures.^{1,2} Two successive quarters of GDP decline in real terms (adjusted for inflation) is a recession. The U.S. economy experienced 18 months of contraction from December 2007 through June 2009 in what has been called the "Great Recession", the longest recession since the Great Depression.

Throughout the recent recession, and since a very uneven recovery began, many have questioned the continued dependence on GDP as a guidepost for economic development. Editorials and newspaper articles have questioned the relevance of 20th century indicators and policies to guide 21st century economies.³ High-level national and international meetings have called for new economic paradigms to address the integrated challenges of persistent poverty, environment degradation, and social unrest.⁴ And policy-makers are turning to a vast literature in macroeconomics for guidance on implementing new metrics of success.

Research on alternative macroeconomic indicators dates back to the work of economists William Nordhaus and James Tobin (1972) on a Measure of Economic Welfare (MEW), followed by Herman Daly and John Cobb (1989) on the Index of Sustainable Economic Welfare (ISEW). These approaches developed monetized adjustments to GDP to investigate the sustainability of consumption and later became incorporated into a more standardized Genuine Progress Indicator, or GPI (Cobb et al. 1995). The basic framework builds from national income accounting and involves multiple methods to estimate a level and value for each of 24 sub-indicators. Generally, GPI begins with personal consumption from GDP, adjusts for income distribution, and then includes a series of subtractions for ignored and miscounted costs of economic activity and additions of non-market benefits (see Table 1)

In recent years, the GPI and ISEW have been estimated and refined in over 20 countries,⁵ including a series of national estimates for the US (Cobb et al. 1995; Anielski and Rowe 1999; Talbreth et al. 2007). A significant literature has developed that is advancing both the theory and application to policy (e.g. Neumayer 2000; Lawn 2003; Lawn 2005; Clarke and Lawn 2008). At the state-level, the first state GPI in the US was published for Vermont in 2004 (Costanza et al.), which laid the groundwork for other published studies in Maryland (McGuire et al. 2011), Ohio (Bagstad and Shammin, 2012), Utah (Berik et al. 2011), and Northern Forest counties (Bagstad and Ceroni 2008). A June 2013 "GPI in the States" summit convened in Baltimore by the Governor of Maryland brought together 18 states with GPI accounts under consideration; including forthcoming GPI tables for Hawaii, Massachusetts, and Oregon that will be comparable to Vermont and Maryland.

Current work on a Vermont GPI is guided by Act 113, signed into law on May 8, 2012 (see Appendix 1). The act directs the University of Vermont's Gund Institute for Ecological Economics to:

1. Build the database to produce annual GPI estimates;
2. Work with Vermont's Secretary of Administration to institute a data advisory group representing the broad public, private, and civil society interests included in GPI;
3. Develop and test the use of GPI in state public policy and budget analysis; and
4. Review and propose additional factors to enhance the standard GPI.

This report summarizes the initial effort by the Gund Institute to build a Vermont GPI database with annual estimates for 1960 through 2011. This initial effort benefited from data sharing from state agencies and Vermont non-profits (summarized in Appendix 2), building a foundation for a GPI Data Advisory Group to be formed later this year. Comparability to the current Maryland methodology was an overarching goal, using identical sub-indicators and aggregation methods, with only minor improvements to some data sources (that the State of Maryland is incorporating in their next annual estimate). GPI trend and factor share analysis are highlighted, with specific attention to changes over the past decade. Initial recommendations are offered for data improvements, policy application, and significant methodological improvements to develop in concert with other states. A technical report is available with methodology, data sources, policy applicability, and recommendations for further work summarized for each of the 25 GPI components.

RESULTS

Since 1960, the Gross State Product (GSP) per capita in Vermont has grown each year in real terms (adjusting for inflation) by an average of 2.2%. In 2011, the average Vermonter's share of the economy (about \$41,353 per person in 2011\$) was about three times the size of the 1960 average. Assuming a similar proportion of personal consumption expenditures found in the make-up of US GDP, Vermonters today consume two times more per capita than in 1970. That's two times the value of goods and services purchased by each Vermonter each year. More cars on our streets and highways, bigger houses with more furniture and appliances, larger wardrobes in our expanding closets and storage areas, more dinners out or coffees on the road, and in general more material things to meet both our basic needs and our expanding consumer appetites.

The costs of this consumption is measured by dollars spent in the marketplace, and the size of these expenditures is often equated with the success of an economy in delivering economic welfare or well-being. However, simply counting price times quantity of private goods and services misses many dimensions of our livelihoods and choices over production and consumption that may be more sustainable. GSP does not tally the effects of economic production on air and water quality, doesn't count the depletion of non-renewable resources, ignores damage to the ozone layer and the global climate system, and sees no economic loss in the degradation of our farms, forests and wetlands. To pay for this consumption only the value of compensated work is counted, missing the opportunity costs of time away from family, community, or leisure. As an accounting system, GSP also misses the cost to society of underemployment, under-education, and income inequality. Consuming things that wear out rapidly and need to be replaced often, paying for defensive or remedial expenditures

from crime or pollution, repairing roads and highways from storms, and supporting broken families to duplicate for two households the consumption patterns they had with one, all register as positive contributions to society when GSP is used as a measure of economic wellbeing. All send signals to the marketplace to produce more without care to whether consumption is desirable, who receives the benefits, and who bears the burden in this and future generations.

The Genuine Progress Indicator was designed to address some of these deficiencies in standard economic accounting. Table 1 presents the 2011 estimates for both the total and per capita Vermont GPI and its components (reported in 2000\$). Table 2 summarizes average annual growth rates for the 1980s, 1990s, and 2000s, and annual growth for 2011. Figure 1 presents historical estimates of per capita GPI and GSP in Vermont, and Figure 2 disaggregates GPI into economic, environmental, and social indicator sets.

Some highlights of the *overall results* include the following:

- **Large Gap between GPI and GSP.** In 2011, per capita GPI was 42.8% less than GSP (highlighted in Figure 1). This gap is up from a 20-year low of 38.0% in 2007 just before the Great Recession. However, the gap the year before hit an 11-year high at 45.6%, the 4th highest divergence between GPI and GSP over the 52-year estimation period. When compared to only personal consumption expenditures – the largest component of GSP and starting point for GPI calculations – the 2011 gap is 27.9%.
- **"Progress" Recovery Lags Behind.** The economic, environmental, and social indicator groups plotted in Figure 2 each sum to 120%, -58%, and 38% of GPI in 2011, resulting in an overall annual increase of Vermont GPI of 5.34% over 2010. While this change is nearly 4.5 percentage points above the average growth rate of the 2000 decade, the 2011 GPI is still 7.3% below the historic peak in 2007, just before the recession. While Vermont GSP per capita has nearly recovered to pre-recession levels, the GPI lags due in part to the unequal distribution of growth in the national and state economy.
- **Peaking GPI?** A recent compilation of national GPI studies places a global per capita peak at 1978 (Kubiszewski et al. 2013), the same year as the early per capita US GPI peak (surpassed slightly by 1983). The 2007 Vermont peak in per capita GPI occurred 30 years later (after an earlier peak in 1966), and shows some signs of a post-recession rebound. However, the growth rate has clearly been leveling off. Decadal estimates of average annual per capita GPI growth rates for the 1980s, 1990s, and 2000s were 2.33%, 0.84%, and 0.56%, respectively.

Table 1. Vermont Genuine Progress Indicator, Total and Per Capita, 2011

	Total 2000\$ (billions)	Per Capita 2000\$	% of GPI
Gross State Product	20.274	32,364	
Genuine Progress Indicator	11.588	18,499	100.00%
Economic			
Personal Consumption Expenditures	16.064	25,644	138.63%
Income Inequality Adjustment	-3.181	-5,078	-27.45%
Services of Consumer Durables	2.928	4,674	25.27%
Cost of Consumer Durables	-1.716	-2,740	-14.81%
Cost of Underemployment	-0.549	-876	-4.74%
Net Capital Investment	0.400	639	3.46%
Environmental			
Cost of Water Pollution	-0.038	-61	-0.33%
Cost of Air Pollution	-0.025	-39	-0.21%
Cost of Noise Pollution	-0.021	-33	-0.18%
Cost of Net Wetland Change	-0.051	-81	-0.44%
Cost of Net Farmland Change	-1.367	-2,183	-11.80%
Cost of Net Forest Cover Change	0.136	217	1.18%
Cost of Climate Change	-0.798	-1,274	-6.88%
Cost of Ozone Depletion	-0.963	-1,537	-8.31%
Cost of Nonrenewable Energy Depletion	-3.627	-5,790	-31.30%
Social			
Value of Housework	3.488	5,569	30.10%
Cost of Family Changes	-0.140	-223	-1.21%
Cost of Crime	-0.041	-66	-0.36%
Cost of Personal Pollution Abatement	-0.099	-159	-0.86%
Value of Volunteer Work	0.251	401	2.17%
Cost of Lost Leisure Time	-1.123	-1,793	-9.69%
Value of Higher Education	2.301	3,672	19.85%
Services of Highways and Streets	0.621	991	5.36%
Cost of Commuting	-0.583	-931	-5.03%
Cost of Motor Vehicle Crashes	-0.279	-445	-2.41%

Table 2. Vermont Genuine Progress Indicator, Growth Rates by Decade and Current

	Average Annual Growth Rate (%)			
	1980s	1990s	2000s	2010 to 2011
Gross State Product	3.77%	1.58%	0.88%	0.31%
Genuine Progress Indicator	2.33%	0.84%	0.56%	5.34%
Economic				
Personal Consumption Expenditures	2.56%	2.07%	1.18%	1.48%
Income Inequality Adjustment	3.18%	7.23%	3.38%	-9.43%
Services of Consumer Durables	1.55%	1.00%	2.08%	-1.80%
Cost of Consumer Durables	2.76%	2.52%	-1.12%	2.62%
Cost of Underemployment	1.22%	-1.19%	9.09%	-7.69%
Net Capital Investment	6.26%	11.09%	273.32%	30.35%
Environmental				
Cost of Water Pollution	1.43%	12.45%	-1.80%	1.05%
Cost of Air Pollution	17.84%	17.57%	***	***
Cost of Noise Pollution	-0.63%	1.00%	0.05%	0.29%
Cost of Net Wetland Change	0.52%	-0.73%	-0.23%	-0.05%
Cost of Net Farmland Change	1.09%	0.27%	0.00%	-0.08%
Cost of Net Forest Cover Change	4.55%	1.21%	-0.76%	2.54%
Cost of Climate Change	4.34%	4.37%	2.91%	2.09%
Cost of Ozone Depletion	2.79%	-0.61%	-0.89%	-0.91%
Cost of Nonrenewable Energy Depletion	1.99%	2.07%	-0.75%	-0.08%
Social				
Value of Housework	0.30%	-2.35%	-0.52%	0.83%
Cost of Family Changes	-0.45%	0.16%	-2.15%	2.06%
Cost of Crime	2.03%	0.81%	0.65%	2.13%
Cost of Personal Pollution Abatement	1.97%	-1.95%	1.77%	1.79%
Value of Volunteer Work	1.34%	4.68%	-0.61%	13.50%
Cost of Lost Leisure Time	4.21%	3.97%	1.86%	1.22%
Value of Higher Education	3.24%	2.42%	1.48%	1.55%
Services of Highways and Streets	-0.99%	1.50%	4.56%	-0.08%
Cost of Commuting	2.13%	1.86%	0.66%	-0.26%
Cost of Motor Vehicle Crashes	-3.81%	-3.56%	1.12%	0.20%

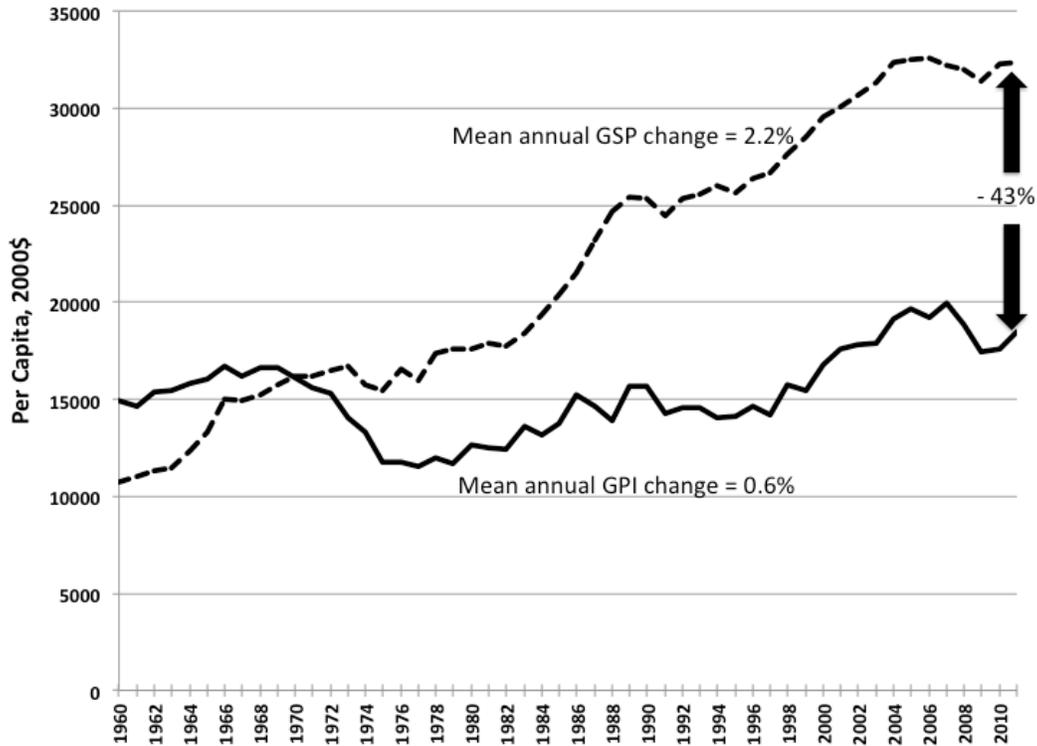


Figure 1. Vermont Gross State Product (GSP) vs. Genuine Progress Indicator (GPI)

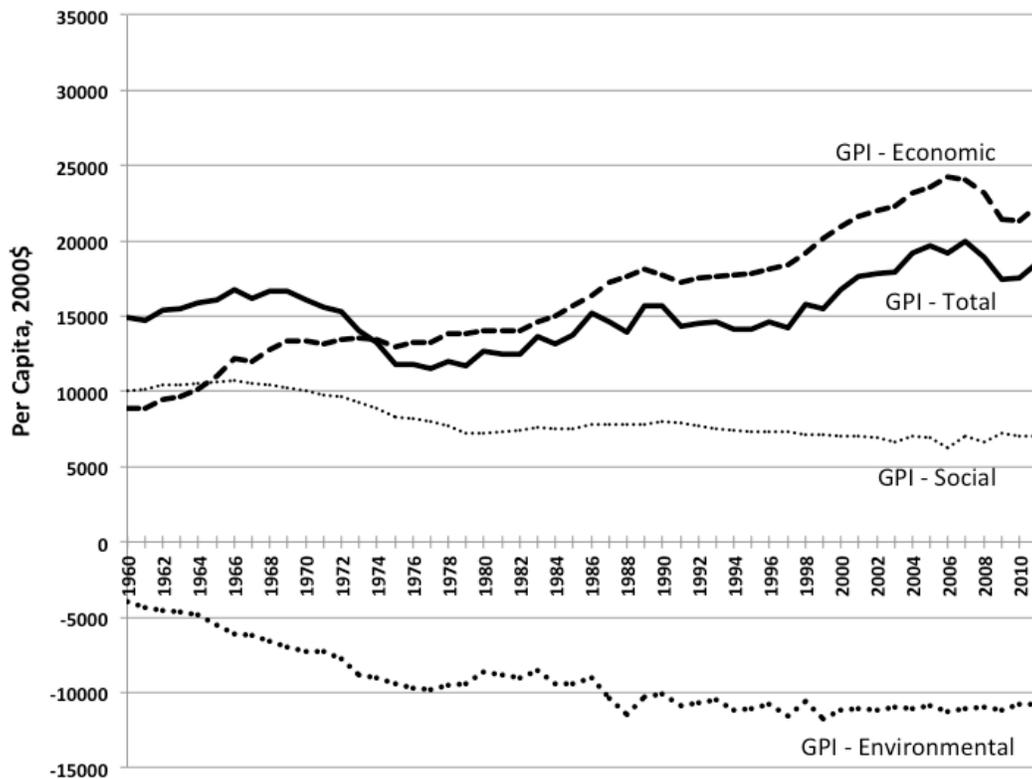


Figure 2. Vermont Genuine Progress Indicator (GPI) Broad Components

Highlights from the *economic indicators* include:

- **An Unequal Recovery.** After a leveling of income inequality in the earlier part of the decade, following a year 2000 peak, Vermont income inequality reached a 50-year high in 2010. The 2011 estimate saw a slight improvement. The income inequality adjustment in 2011 accounted for the second largest deduction to Vermont GPI.
- **Vermont's Underemployed.** The cost of underemployment has grown from a 2.6% deduction to GPI in 2000 to 4.7% in 2011. The reported Vermont underemployment rate hit a nearly 50-year high in 2010 at 12.5% (only the 1975 estimate was higher), 6.1 percentage points higher than the unemployment rate.⁶ The 2011 underemployment and unemployment rates showed some improvement, dropping to 11.6% and 5.6%, respectively. The most recent underemployment estimate from the Bureau of Labor Statistics for Vermont is 10.5%, the 7th lowest of 50 states and well below the U.S. average of 14.3%.⁷
- **Investing in Vermont Investment Data.** Data for net capital investment, and the cost of and services from consumer durables, each have a strong influence on GPI estimates, however Vermont-specific data was not available for this study. Net capital investment in particular is highly variable at the national level and a major driver of the business cycle. Estimates for these three indicators are scaled down from national data and would benefit from the acquisition of future data from the state and private sources available for purchase.

The *environmental indicators* together sum to a negative 58% impact on GPI. This is down considerably from the 1977 estimate, a year when environmental indicators together accounted for an 85% impact and the cost of non-renewable energy depletion alone had a 50% impact (a 52-year high). Some specific highlights include:

- **Genuine Progress through Energy Efficiency and Renewability.** The cost of nonrenewable energy depletion is currently the single largest deduction to GPI, accounting for a 31.3% deduction. However, this is a marked improvement from just 15 years ago when the deduction hit a 30-year of 44% in 1997. Total electricity consumption in 2011 was 91% of the 1999 high of 25 billion kilowatt-hours. Fossil fuel consumption outside of the electricity sector in 2011 was 84% of the 2004 high of nearly 18 million barrel equivalents. Growth in renewable energy over the last decade has also contributed to lowering this significant cost. Achieving the renewable energy goals of Vermont's 2011 Comprehensive Energy Plan reinforce this trend and result in significant improvements to GPI.
- **Farm Acreage Down, Farms Numbers Up.** Loss of farmland has stabilized in recent years, slowing to an average of 8,000 acres lost per year during the 2000s, down from 15,000 acres lost per year in the 1990s. This has decreased the 2011 GPI deduction to 11.8%, down from a 25-year high of 15.2% in 1997. The number of Vermont farms

has slowly grown to a 25-year high of approximately 7000 farms, up from the 52-year low of 6100 farms in the early 1990s.

- **Forestlands Up and Down.** Acreage of Vermont forestland peaked in 1997 at 4.6 million acres, about 643,000 more forested acres than 1960 at the beginning of the time series. Forest acres over the last 15 years have been up and down, with residential use converting forest to housing in some parts of the state, and farmland converting back to forest in other parts of the state. It will be critical to get a more accurate accounting of Vermont forest cover and assess the full value of forest ecosystem services in future GPI estimates, a study that the Gund Institute is beginning later this year.
- **Clean Local Air with More Global Pollution.** The cost of air pollution in Vermont continues to be low. The number of days exceeding ozone standards has varied between 0 and 5 days for 11 of the last 15 years (and 0, 0, and 1 for the last 3 years of the analysis). However, the state's contribution to global pollution is mixed. Greenhouse gas emissions continue to grow, but at a slower annual rate than the 1980s and 1990s. Vermont is well behind its greenhouse gas reduction goals to reduce emissions below 1990 levels by 25 percent by 2012, 50 percent by 2028, and 75 percent by 2050 (codified in 10 V.S.A. § 578). Achieving these levels in future years, while maintaining local air quality, would result in a significant improvement to GPI.
- **Persistent Water Pollution.** The annual increases in the cost of water pollution have leveled as compared to the 1990s, however the poor quality of Vermont waterways continues to be a drag on GPI. Nearly 11% of the mileage of Vermont rivers and streams was considered degraded in 2011, and nearly 87% of the acreage of Vermont lakes and ponds was degraded, the highest percentage in a decade. Major improvements to this indicator should occur through completing current tasks of the Lake Champlain Basin Program's Opportunity Action highlighted in the final chapter on "Sustainable Economic Development in the Lake Champlain Basin".

Taken together, the *social indicators* boost Vermont's GPI considerably. One of the largest contributions is the value of household work, based on national estimates scaled to Vermont. Highlights of Vermont-specific trends include:

- **Volunteering in Vermont.** According to statistics from the Federal Agency for Service and Volunteering, 32% of Vermont residents volunteered in 2011, ranking Vermont 14th among the 50 States and Washington, DC. Vermonters contributed an average of 36 hours per resident to volunteer work in 2011, high by US standards, but a 10-year low for Vermont. When multiplied by the Vermont population and mean hourly earnings adjusted to year 2000 dollars (\$13.63), the estimated value of volunteering to our genuine progress is over \$250 million. An estimated 73% report doing favors for their neighbors (5th highest in the nation), 87.4% eat dinner with

family a few times a week or more, and 59.1% discuss politics a few times a month or more.

- **Crime Costs Trending Downward.** While the cost of crime continued to grow over the past decade, it is growing at less than half the annual rate of the 1980s. As a percentage of GPI, the estimated economic cost of crime was at a 45 year low in 2011, comparable to low crime costs of the 1960s. A notable exception is the 635 aggravated assaults recorded for 2011, surpassing 600 for the 2nd time in Vermont's history. Break-and-enter crimes in Vermont also reached a 12-year high at 3,643.
- **Motor Vehicle Safety Holding Steady.** The cost of motor vehicle crashes reached a 52-year low in 2001 following significant declines through the 1980s and 1990s. Over the past decade, overall costs have remained fairly flat, with modest increases in recent years. In 2011, the lowest number of motor vehicle crashes with mortalities was recorded since data collection began in 1992.
- **Vermonters Love to Drive.** The eight years with the highest cost of commuting in Vermont were the last eight years! The estimated cost of commuting in 2011 was the third highest over the 52-year period (only 2008 and 2010 were higher). While the rate of change is slowing from the 1980s and 1990s, costs continue to escalate. In 2011, Vermont had the 7th highest level of vehicle-miles driven per capita in the US at 11,630 (down from the 2nd highest a few years ago). The estimated percent of workers carpooling is 11%.
- **Higher Education Hits New High.** The percent of Vermonters with a bachelors degree or higher reached an all-time high in 2011 of 33.1%, an estimated 144,000 adults over the age of 25. An educated citizenry significantly boosts GPI through the accrual of positive externalities. For example, a well-educated workforce can attract economic investment that benefits communities more broadly, and high levels of education will generally reduce social expenditures in other areas, including crime and law enforcement. Significant work remains to be done on the impacts of other investments in education, such documented benefits from early childhood programs.

Lastly, Figure 3 provides a comparison between per capita GPI estimates for Vermont, Maryland, and US studies (all in billions of 2000\$). Vermont is the smallest state economy in the US, accounting for less than 0.18% of US GDP, while Maryland is the 15th largest and accounting for more than 2% of the national economy. In per capita terms, Vermont climbs to 30th and Maryland to 14th. The larger per capita consumption in Maryland (the starting point for GPI aggregation) is the main reason for the larger GPI per capita. Both Maryland and Vermont are tracking above the US average, extending their peaks into recent years.

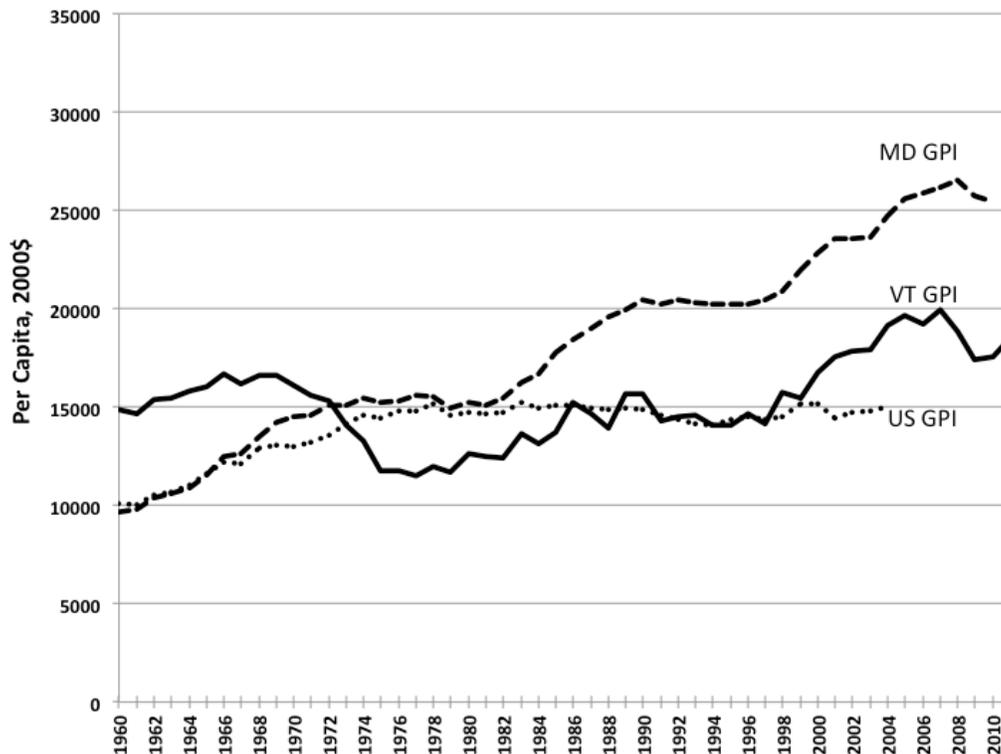


Figure 3. Per Capita GPI Comparison between Maryland, Vermont, and United States

RECOMMENDATIONS

This report summarized the 2011 GPI estimate, historical trends, and key findings. A full analysis of each indicator, including notes on methodology and data sources, is available in a separate Vermont GPI Technical Review. While this first stage of development was guided by a goal of comparability with Maryland and US estimates, improvements to data sources and methods have created a new standard for state GPI studies that is being adopted by Maryland and a handful of new state studies.

The next steps are to form the data advisory group called for by Act 113 to further improve Vermont GPI estimates during the 2012 update this fall. *Recommendations for data and methodological improvements* are detailed in the Technical Review, including developing:

1. **Vermont-specific data** sets to replace variables that predominantly use national data;
2. **Values for environmental variables** that can be adjusted by geographic context;
3. **Time use data** for social variables to account for Vermont differences from national trends; and
4. A joint strategy with other GPI states on the development and implementation of new methods leading to a **new GPI standard**.

The most immediate needs for Vermont-specific data include estimates for time use, net capital investment, personal consumption, consumer durables, and ecosystem service values by land cover. Simultaneous to these improvements is the ongoing *development of policy applications*, including:

1. Application to **outcomes-based budgeting** through the use of complementary population-level indicators incorporated into GPI, such as education levels, volunteer rates, crime, public transit, and other social statistics;
2. Incorporation into the **Governor's Dashboard** as a cross-cutting, topline indicator of the health of the macroeconomy;
3. Evaluation of the economic, environmental, and social **trade-offs of long-term policy goals**, including the Vermont Comprehensive Energy Plan, greenhouse gas reduction goals, and a forthcoming Comprehensive Economic Development Strategy.
4. Creation of a **GPI note**, analogous to a fiscal note, to assess the impact of legislation on the 25 components of GPI.

In summary, and in the words of John Talbreth from the national study, the GPI has the potential to become a "headline indicator for the new economy." Developing, evaluating, and ultimately using GPI to help guide state policy can help shift the fundamental philosophy of economic development. Too often the growth economy has been focused on short-term profits, with the goal of squandering resources as fast as possible. The genuine economy is focused on generating long-term value, with the goal of sustaining profits, people, and planet. The conventional growth model encourages the depletion of non-renewable resources and externalization of costs on distant people in distant lands and distant futures. Genuine progress occurs through substituting renewable for non-renewable resources and internalizing the full cost of economic activity. Progress can't mean squeezing every last waking hour out of labor until workers are tired, sick, demoralized and in need of replacement by the next in line. Progress is ultimately about striking a healthy balance between work, family, community, and leisure, and building together a widely-shared well-being.

NOTES

1. For an overview on national income accounting, see "Measuring the Economy: a Primer on GDP and the National Income and Product Accounts" by the U.S. Bureau of Economic Analysis, available at: www.bea.gov/national/pdf/nipa_primer.pdf (accessed on Jul. 28, 2013).
2. The U.S. GDP for the Q1 of 2013 was composed of 71% consumption, 13% business investment, 19% government expenditures, and -3% net exports. See: Bureau of Economic Analysis, "Gross Domestic Product: First Quarter 2013 (Third Estimate)," BEA 13-30, Jun. 26, 2013, available at: www.bea.gov/newsreleases/national/gdp/2013/pdf/gdp1q13_3rd.pdf (accessed on Jul. 28, 2013).
3. See for example: T.L. Friedman, "The Inflection is Near," Op-Ed, *New York Times*, Mar. 8, 2009, p. WK12; E. Zencey, "G.D.P. R.I.P.," Op-Ed, *New York Times*, Aug. 10, 2009, p. A17; P. Krugman, "Building a New Green Economy," *New York Times Magazine*, Apr. 11, 2010, p. MM34; and J. Gertner, "The Rise and Fall of GDP," *New York Times Magazine*, May 16, 2010, p. MM60.
4. For example, in 2007 the European Commission, European Parliament, Club of Rome, OECD and WWF hosted the high-level conference "Beyond GDP" which resulted in the 2009 European Commission roadmap "GDP and Beyond: Measuring Progress in a Changing World", available at: www.beyond-gdp.eu (accessed on Jul. 28, 2013). In 2008, the French government formed the "Commission on the Measurement of Economic Performance and Social Progress" chaired by Nobel laureate Joseph Stiglitz, available at: www.stiglitz-sen-fitoussi.fr/en/ (accessed on Jul. 28, 2013). And in 2012, the United Nations convened a meeting on "Happiness and Well-being: Defining a New Economic Paradigm" resulting in the adoption of UN Resolution 65/309 inviting member states to "pursue the elaboration of additional measures that better capture the importance of the pursuit of happiness and well-being in development with a view to guiding their public policies."
5. Studies of the GPI and ISEW at the national scale include: Australia, Austria, Belgium, Chile, China, Czech Republic, France, Germany, India, Italy, Japan, Netherlands, New Zealand, Poland, Scotland, Sweden, Thailand, United Kingdom, United States, Vietnam, and Wales. For a summary analysis of studies across multiple scales, see Posner and Costanza (2011).
6. Underemployment is measured as the U6 rate reported by the U.S. Bureau of Labor Statistics and includes, "Total unemployed, plus all persons marginally attached to the labor force, plus total employed part time for economic reasons, as a percent of the civilian labor force plus all persons marginally attached to the labor force."
7. Reported as the average of the third quarter of 2012 through second quarter of 2013 by the U.S. Bureau of Labor Statistics, available at: data.bls.gov/cgi-bin/print.pl/lau/stalt.htm (accessed on Jul. 29, 2013).

REFERENCES

Anielski, M., and J. Rowe, J., *The Genuine Progress Indicator – 1998 Update*, Redefining Progress, San Francisco, CA, 1999.

Bagstad, K. J., and M. Ceroni, "The Genuine Progress Indicator: a New Measure of Economic Development for the Northern Forest," *Adirondack Journal of Environmental Studies*, 15(1), 2008.

Bagstad, K.J., and M.R. Shammin, M.R., "Can the Genuine Progress Indicator Better Inform Sustainable Regional Progress?—A Case Study for Northeast Ohio," *Ecological Indicators*, 18, 330-341, 2012.

Berik, G., Gaddis, E., Bagstad, K., and J. Lowry, *The Utah Genuine Progress Indicator (GPI), 1990 to 2007*, Utah Population and Environment Coalition, Salt Lake City, UT, 2011.

Clarke, M., and P. Lawn, "A Policy Analysis of Victoria's Genuine Progress Indicator," *Journal of Socio-Economics*, 37(2), 864-879, 2008.

Cobb, C., Halstead, T. and J. Rowe, "The Genuine Progress Indicator," Redefining Progress, San Francisco, CA, 1995.

Costanza, R., Erickson, J.D., Fligger, K., Adams, A., Adams, C., Altschuler, B., Balter, S., Fisher, B., Hike, J., Kelly, J., Kerr, T., McCauley, M., Montone, K., Rauch, M., Schmiedeskamp, K., Saxton, D., Sparacino, L., Tusinski, W., and L. Williams, L., "Estimates of the Genuine Progress Indicator (GPI) for Vermont, Chittenden County and Burlington, from 1950 to 2000," *Ecological Economics*, 51(1), 139-155, 2004.

Daly, H. and J. Cobb, *For the Common Good*, Beacon Press, Boston, MA, 1989.

Kubiszewski, Ida, et al. "Beyond GDP: Measuring and Achieving Global Genuine Progress," *Ecological Economics*, 93, 57-68, 2013.

Lawn, P.A., "A Theoretical Foundation to Support the Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), and Other Related Indexes," *Ecological Economics*, 44(1), 105-118, 2003.

Lawn, P.A., "An Assessment of the Valuation Methods used to Calculate the Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), and Sustainable Net Benefit Index (SNBI)," *Environment, Development and Sustainability*, 7(2), 185-208, 2005.

McGuire, S., S. Posner, and H. Haake, "Measuring Prosperity: Maryland's Genuine Progress Indicator," *Solutions*, 3, 50-58, 2012.

Neumayer, E., "On the Methodology of ISEW, GPI and Related Measures: Some Constructive Suggestions and Some Doubt on the 'Threshold' Hypothesis," *Ecological Economics*, 34(3), 347-361, 2000.

Nordhaus, W.D., and J. Tobin, "Is Growth Obsolete?" *Economic Research: Retrospect and Prospect, Vol 5: Economic Growth*, National Bureau of Economic Research, 1972, pp. 1-80.

Posner, S. M., and R. Costanza, R., "A Summary of ISEW and GPI Studies at Multiple Scales and New Estimates for Baltimore City, Baltimore County, and the State of Maryland," *Ecological Economics*, 70(11), 1972-1980, 2011.

Talberth, J., C. Cobb, and N. Slattery, "The Genuine Progress Indicator 2006," *Redefining Progress*, Oakland, CA, 2007.

APPENDICES

Appendix A

Vermont Act 113 – An act relating to the genuine progress indicator

It is hereby enacted by the General Assembly of the State of Vermont:

Sec. 1. PURPOSE, DEFINITION, AND INTENT

(a) Purpose. The purpose of the genuine progress indicator ("GPI") is to measure the state of Vermont's economic, environmental, and societal well-being as a supplement to the measurement derived from the gross state product and other existing statistical measurements.

(b) Definition. The GPI is an estimate of the net contributions of economic activity to the well-being and long-term prosperity of our state's citizens, calculated through adjustments to gross state product that account for positive and negative economic, environmental, and social attributes of economic development.

(c) Intent. It is the intent of the general assembly that once established and tested, the GPI will assist state government in decision-making by providing an additional basis for budgetary decisions, including outcomes-based budgeting; by measuring progress in the application of policy and programs; and by serving as a tool to identify public policy priorities, including other measures such as human rights.

Sec. 2. GENUINE PROGRESS INDICATOR

(a) Establishment; maintenance.

(1) The secretary of administration shall negotiate and enter into a memorandum of understanding with the Gund Institute for Ecological Economics of the University of Vermont (the "Gund Institute") to work in collaboration to establish and test a genuine progress indicator (GPI). The memorandum shall provide the process by which the GPI is established and, once tested, how and by whom the GPI shall be maintained and updated. The memorandum shall further provide that in the establishment of the GPI, the secretary of administration, in collaboration with the Gund Institute, shall create a Vermont data committee made up of individuals with relevant expertise to inventory existing datasets and to make recommendations that may be useful to all data users in Vermont's state government, nonprofit organizations, and businesses.

(2) The GPI shall use standard genuine progress indicator methodology and additional factors to enhance the indicator, which shall be adjusted periodically as relevant and necessary.

(b) Accessibility. Once established, the GPI and its underlying datasets that are submitted by the Gund Institute to the secretary of administration shall be posted on the state of Vermont website.

(c) Updating data. The secretary of administration shall cooperate in providing data as necessary in order to update and maintain the GPI.

Sec. 3. PROGRESS REPORTS

By January 15, 2013 and once every other year thereafter, the secretary of administration shall report to the house committees on government operations and on commerce and economic development and the senate committees on government operations and on economic development, housing, and general affairs a progress report regarding the maintenance, including the cost of maintenance, and usefulness of the GPI.

Sec. 4. DATASETS

Any datasets submitted to the secretary of administration pursuant to this act shall be considered a public record under chapter 5 of Title 1.

Sec. 5. EFFECTIVE DATE

This act shall take effect on passage.

Approved: May 8, 2012

Appendix B
GPI Collaborators (to date)

Ken Bagstad, Ph.D.
U.S. Geological Survey

Tom Barefoot
Gross National Happiness USA

Matthew J. Barewicz
VT Department of Labor

Jessie Brosseau, MPH
VT Department of Health

Ernest Christianson
VT DEC Drinking Water & Groundwater Prot. Div.

Chris Cole
VT Agency of Transportation

Andrea Colnes
Energy Action Network

Lew Daly
DEMOS

Lauren-Glenn Davitian
Common Good Vermont

Shannon Fassett, & Holly Hayden
VT Department of Motor Vehicles

David J. Healy
Stone Environmental, Inc.

Monica Hutt
VT Agency of Human Services

Kate Jellema, Ph.D.
Benchmarks for a Better Vermont

Cathy Kashanski
VT DEC Watershed Management Division

Shelley Kath
Natural Resources Defense Council

Anne Lezak
Benchmarks for a Better Vermont

Shayla Livingston, MPH
VT Department of Health

Kate McCarthy
Vermont Natural Resources Council

Sean McGuire & Alfredo Goyburu
Maryland Department of Natural Resources

Jeffrey R. Merrell
VT DEC Air Pollution Control Division

Jon Moore
Chittenden County Transportation Authority

Shannon Morrison
VT DEC Watershed Management Division

Michael Moser
Center for Rural Studies, University of Vermont

Jim Moulton
Addison County Transit Resources

Costa Pappis, AICP
VT Agency of Transportation

David Pelletier
VT Agency of Transportation

Jen Peterson, and Ryan Torres
Vermont Community Foundation

Steve Posner
Gund Institute, University of Vermont

Erin Roche
Center for Rural Studies, University of Vermont

Ralph Tiner
U.S. Fish and Wildlife Service

Austin Troy, PhD
UVM Transportation Research Center

Linda Wheatley
Vermont Leadership Institute & GNH USA

Mandy White
VT Agency of Transportation



University of Vermont
617 Main Street, Burlington, VT 05405

(802) 656-2906 gundiee@uvm.edu