# Valuing Common Assets for Public Finance in Vermont

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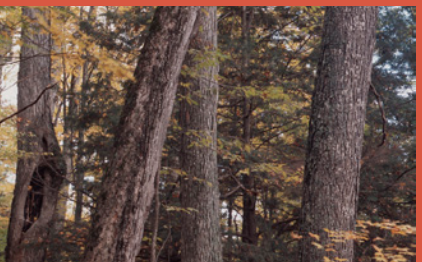

**Vermont Green Tax and Common Assets Project**
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**Vermont Green Tax and Common Assets Project**
This project has the purpose of achieving environmental sustainability, distributional equity, and an efficient economy through the use of market mechanisms like green taxes and common asset payments. We advocate achieving environmental sustainability and a steady-state economy by taxing throughput (depletion, land use, and pollution) more, and value added less. In addition, we promote a new economic paradigm based on the recovery of revenue from privatized common assets, and management of the commons by trustees responsible to current and future generations. Equity can be achieved by charging economic rent on unearned income from enclosure of "the commons", and distributing this revenue directly to everyone in society, as done by the Alaska Permanent Fund.

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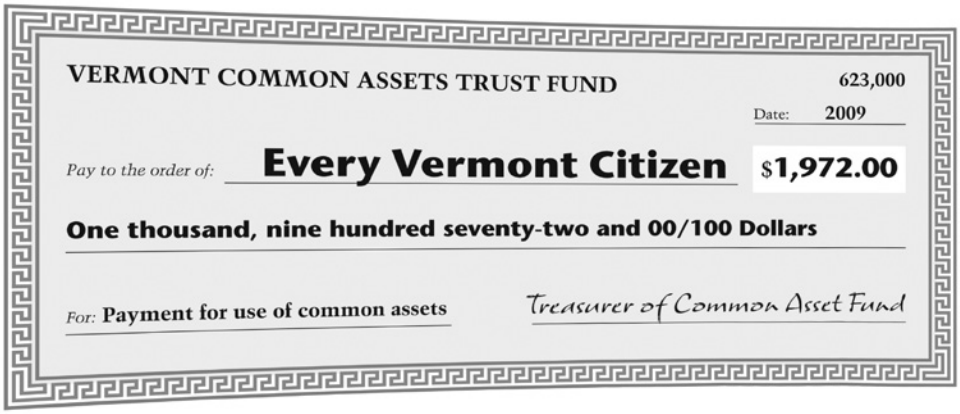



# Valuing Common Assets for Public Finance in Vermont

## Contents

*"There is nothing more difficult to carry out, more doubtful of success, nor more dangerous to handle, than to initiate a new order of things. For those who would institute change have enemies in all those who profit by the old order, and they have only lukewarm defenders in all those who would profit by the new order."*

— Nicolo Machiavelli, 1490

# Introduction

One of the primary ways in which wealthy and poor countries differ is in their ownership and control of natural and social resources. Norway, Abu Dhabi, and Alaska all have major oil resources, and are relatively wealthy. Nigeria has massive oil deposits, Congo has gold, diamonds, cobalt, copper and coltan, and yet these countries are desperately poor. Why? One reason is that wealthy countries with good government, all exert sovereignty over their resources and collect resource rents and royalties for public revenue. Poor countries' resources are often controlled by foreign corporations, local dictators, warlords, or militias, and revenue doesn't benefit the public. During the economic slowdown, Norway is turning to its $300 billion sovereign wealth fund to cushion the blow to its economy, instead of using debt. Alaska residents enjoy a nearly $2000 annual dividend from their $30 billion Permanent Fund, and Abu Dhabi's sovereign wealth fund is the world's largest at $800 billion.

In terms of its resources, Vermont resembles an economic colony more than a sovereign state. Our major minerals are owned by a foreign corporation, our groundwater is exported by out of state bottling companies, our hydropower resources are owned by TransCanada, and 82% of surface-water withdrawals in Vermont are used by Vermont Yankee for cooling water. The federal government has given away 98% of our "public airwaves" for free, and allows private banks to create 93% of the currency with interest attached. Meanwhile, citizens and businesses are subject to taxation of earned income, which impacts job creation and economic productivity, while resource owners collect massive amounts of unearned income. All over the world countries are beginning to exert sovereignty over their resources such as Ecuador over oil, and Bolivia over lithium. Can Vermont reclaim sovereignty over its natural and social resources?

Since the Enclosure Acts in England during the 18th and 19th centuries it has been the prevailing trend in capitalist countries to privatize capital and natural resources. It is now apparent that unrestricted, unregulated private ownership is an inefficient means of allocating resources and leads to environmental destruction, increasing inequality, speculation, and boom/bust cycles such as the recent S&L crisis, dot.com collapse, housing bust, and Wall Street meltdown. On the other extreme, history shows that a communistic system of total state ownership of "the means of production" is much worse. A new economic paradigm is needed.

Entrepreneur Peter Barnes offers a new paradigm in his book entitled Capitalism 3.0. In this paradigm, society's common resources (the commons) are reclaimed for the public instead of privatized by corporations. Private enterprise continues as before, but trustees of the commons set sustainable limits on resource use, and resource users pay rent to the public for use of the commons. Ideally, with this increase in revenue there will be decreased need for taxation of earned income such as income and sales taxes on productive activities. Revenue from economic rent on the commons is allocated to restoration and protection of the commons, other public goods, and direct payments to citizens. A model is the Alaska Permanent Fund, where mineral rights belong to the people of Alaska, and 25-50% of oil royalties go into the Permanent Fund, which pays dividends to the citizens of Alaska. There is no reason Vermont cannot have a sovereign wealth fund funded by its common assets, as do Alaska, Abu Dhabi, and Norway.

During the legislative session of 2007/8, Hinda Miller introduced a bill embodying the principles of Capitalism 3.0, written by legislative counsel Al Boright, entitled the Vermont Common Assets Trust Fund Bill: S.44. Numerous co-sponsors signed on, including Senator Condos of Chittenden District, Senator Doyle of Washington District, Senator Illuzzi of Essex-Orleans District, Senator MacDonald of Orange District, Senator McCormack of Windsor District, and Senator Snelling of Chittenden District. After a meeting with David Bollier in September, 2007, legislators requested more information about potential revenue from common assets. The Green Tax and Common Assets Projects presents these collected papers in response to that request.

# Definitions

*(From* State of the Commons, *Tomales Bay Institute, 2003)*

**Commons**: Embraces all the creations of nature and society that we inherit jointly and freely, and hold in trust for future generations.

**Common Property:** A class of human-made rights that lies somewhere between private property and state property. Examples include conservation easements held by land trusts, Alaskans' right to dividends from the Alaska Permanent Fund, and everyone's right to waterfront access.

**Common Wealth:** Monetary and non-monetary value of the commons in supporting life and well-being. Like stockholders' equity in a corporation, it may increase or decrease from year to year depending on how well the commons is managed.

**Common Assets:** Those parts of the commons that have a value in the market. Radio airwaves are a common asset, as are timber and minerals on public lands. So increasingly are air and water. In this report we include ground and surface water, air, land, spectrum, the internet, forests, fish and wildlife, minerals, and wind. Socially created assets like seigniorage (the right to print money), and markets for trading stocks and commodities are also common assets.

**Economic Rent:** Originally explained by Economist David Ricardo (Ricardian rent) as the excess return to some agricultural land- due to its favorable characteristics such as soil fertility, rainfall, access to markets, etc.- from the same effort compared to the output of less productive land. Ricardo called the excess return from the same effort the "unearned increment". The term economic rent has been expanded to include all unearned income from ownership of a resource, from a monopoly, from scarcity, or any other reason resulting in unearned excess profits not due to work, risk, or enterprise. It is also defined as the excess revenue over and above what it takes for a business to reap normal profits. This is the origin of the derogative term "rent-seeking", referring to people who reap where they did not sow. A simple example of economic rent is the recent run-up in oil prices. It has been estimated that oil from the most expensive wells in deep ocean water cost about $60 per barrel to extract including all other costs and normal profit. Easier-to-extract oil costs much less. At the recent price of $147 dollar per barrel, oil companies received economic rent of at least $87 per barrel on deepwater wells. Compared to the current price of $39 barrel oil companies received $108 per barrel of economic rent on their less expensive wells. The source of their "windfall profits" is economic rent.

**Ecosystem services:** Those extremely valuable services provided for free by nature (production of oxygen, pollination, habitat, etc.) that have an economic value in the market of zero, which often results in their liquidation.

**Public Trust Doctrine:** The law where some aspects of the commons are "held by the people in their character as sovereign in trust for public uses for which they are adapted in perpetuity." This doctrine has traditionally been applied to all surface waters in Vermont for "navigation of the waters, to carry on commerce over them, and have liberty of fishing freed from the obstruction or interference of private parties." In 2008 the public trust doctrine was extended to ground water by the legislature.

# Executive Summary

In the following pages eleven students from the University of Vermont have estimated the value of common assets in Vermont, and analyzed current and future management of natural and social resources. By no means are these the final word on the value and management of the "common wealth" of Vermont; they merely begin the conversation about a new way to look at our common assets and public revenue. By recovering economic rent currently privatized, we can begin to shift our public revenue system from taxing value added to charging rent for use of common assets. This allows us to "tax bads, not goods", as many economists from all sides of the political spectrum have urged in recent years.

## Renting the Air: Curbing Emissions from Transportation and Heating in Vermont

*Jennifer Kenyan and Beth Nolan*

In this chapter Kenyan and Nolan look at expansion of the Regional Greenhouse Gas Initiative (RGGI) from the current system of cap and auction permits covering only electric power plants, to cover all greenhouse gas emissions including transportation and heating. They look at the current revenue on fossil fuels and motor vehicles of $209 million, which only indirectly affects carbon emissions by taxing fossil fuel use. They find that expanding RGGI to include all emissions at the recent auction price of $3.07 per ton of carbon would generate $25.9 million. At the British Columbia price of $10/ton it would generate $84.4 million, and at the recent European price of $40/ton this would be $337.6 million. They propose a cap and dividend system to return some of the new revenue from carbon permits to the public to offset the increased price of energy. "If the rates consumers must pay increase, the regressive effects can be mitigated as long as there is a dividend to offset the cost to the consumer. In a cap-and-dividend system, we are regaining our property, reducing air emissions, putting money back into the hands of the consumers, and ultimately, continuing to stimulate our economy."

## Current and Potential Economic Rent in the State of Vermont: Wildlife and Fish

*Ross Saxton*

Of the $14,702,882 of revenue currently received by the Vermont Fish and Wildlife Department in FY06, Saxton determines that about $7.7 million is economic rent and the other approximately $7 million is the result of taxes. He proposes a biodiversity and land conservation plan based on the number and scarcity of species in a given area based on "critical habitats", and payment of rent proportional to species and habitat scarcity for use of these land areas. Saxton supports the recent effort to redirect 1/8 of one-cent sales tax from other programs to fish and wildlife. He also recommends increasing the capital funding of the Fish and Wildlife Trust Fund from $1.6 million to $12 million in order to generate more interest income to use as operating funds.

## Assessing Revenue and Regulation of Vermont Forests?

*Mark Kolonowski*

Current public revenue of $27 million from forests in Vermont consists of $3.2 million from State Forest, $6.58 million from State Parks, $180,486 from Fish and Wildlife (logging), and $17 million from the current use program. Private revenue totals $774 million including $207.4 million from Forest-based manufacturing, $485 million from Recreation/tourism, $32 million from Forestry and logging, and $50 million from Paper and Pulp. Kolonowski proposes two new sources of revenue: a fee for depletion of ecosystem services by logging, and a higher charge for conversion of current use property to non-forest uses. Since logging removes a fund of trees providing ecosystem services such as CO2 absorption, climate regulation, reduction of erosion, habitat, etc. Kolonowski proposes a "Depletion of Ecosystem Services (DES) fee on forestry and logging. This would be similar to what other states capture in taxes on board-feet of lumber, but would reflect a charge

for depletion of the services provided by trees. A tax of 10% on just forestry and logging revenues of $32 million would generate roughly $3.2 million, which could be used to restore forests, and also feed a trust fund for the public. Another possibility is to revise the current use penalty when properties are removed from current use and sold for development. This penalty does not seem to adequately recover the revenue lost during the period of current use for forests. In 2007 the current use program resulted in a reduction of $39.5 million in foregone property taxes, while in 2004 only $404,155 was collected by the current use change tax. A better formula than the present one would recover all the lost revenue from the sale, by finding the original purchase price of the property, adjusting it for inflation, then subtracting it from the selling price. Kolonowski also proposes an auction and insurance bond regulation, and the creation of a Vermont forest land bank. Regarding changes in management, the DES fee could be managed by the Vermont Agency of Natural Resources, the state could appoint private woodland foresters, and the current use program could use additional employees.

## Message in a Bottle: Bottling Economic Rent for Public Revenue

*Colin McClung and Gary Flomenhaft*

Groundwater was put into the public trust in the legislative session of 2008. McClung finds that information is very hard to come by regarding bottling operations in Vermont. There is a question if all bottlers are registered as active or if some are subsidiaries of other active bottlers in order to come below the daily maximum of 50,000 gallons per day without a permit. He finds that groundwater maps are lacking in Vermont. 50 million gallons of groundwater are withdrawn per day in Vermont; 33 million are used for public and private drinking water supply. Some bottlers claim their source is "collected" or artesian" meaning they are collecting natural overflowing water from beneath the surface, and therefore not subject to groundwater limits. McClung finds that 97% of the cost of bottled water is in distribution and marketing, and less than 1% is in the cost of water. He contrasts this with the oil industry where 46% is in the cost of the resource. McClung suggests that at some point there will have to be an ecological cap placed on water withdrawals to prevent depletion of aquifers. 2007 bottled water extraction by just three companies is estimated at 34,017,330 gallons or 104.3 Acre-feet. At a gross profit of $1,300,875 per acre-foot that equals a gross profit of $135.7 million on total revenue of $154.2 million. Giving the bottlers an 18% net profit margin, would still leave 70% of total revenue or $107.9 million for the people of Vermont.. McClung also proposes a preservation fee of 2% on profit per acre-foot of water sold.

## The Ownership of the Internet and World Wide Web in Vermont

*Ida Kubiszewski*

The internet is an interesting case, since it was created entirely with taxpayer's money by DARPA, while the world wide web was created at CERN in Switzerland and placed into the public domain voluntarily in 1993. The internet and web have many features of a commons, and many people refer to the "internet commons". Kubiszewski (pronounced cube-ih-shefski) explores the intricacies of the internet and world wide web to determine if internet companies are extracting economic rent from the public and how it could be recovered. She finds that companies are making a substantial profit by utilizing a resource that was developed by a collective whole and not through their own efforts. In particular, services of ISPs connecting people to the web should be subject to rent as well as the provision of web domain names.

Kubiszewski determined that the average profit for Fortune 1000 companies is 7% and everything above that could be considered economic rent. She finds that economic rent from public telecoms to be $17 million, private ISPs to be $3.3 million, and domain names $9.3 million. "Totaling up all the economic rent, we find that economic rent owed to Vermonters is approximately $30 million per year. Instead of dividing this money into equal dividend of about $50 per person, which promotes consumption and encourages the investment into private goods, the money would be placed into a trust with the primary purpose of supporting and furthering research and intellectual development in an open forum."

## Use Value and Management Structure of Broadcast Spectrum in the US

*William Murray*

Murray tells us that after restructuring in 1994, broadcast frequencies have been allocated by a one-time auctioning system. Only 2% has been auctioned this way, while before restructuring, 98% of spectrum was merely given away to private entities for the exchange of "in-kind" public service rather than cash. This is despite the Communications Act of 1934, which states that broadcast spectrum belongs to the public. New technologies are available that use receivers capable of utilizing "smart" technologies to pick out only the channels they need. Signal interference could soon be a thing of the past, which could make exclusive licenses unnecessary. Currently 64% of the most valuable spectrum below 3.1 GHz is reserved for government use paying no fees. Murray cites a New America Foundation study which calculated the total annual use value of spectrum at $302 billion, mainly broadcast TV, mobile

phones, and satellite communications. "Among all else, it is clear that the current mismanagement of socialized radio spectrum allocation provides one of the most promising opportunities for commons reform in the future." Murray's calculation of Vermont's share of spectrum value provides a figure of $625 million. Using a normal profit of $250 million, he calculates potential economic rent in Vermont from spectrum at $375 million. Murray suggests an annual instead of one-time auction, which would provide an ongoing revenue stream from spectrum. "Given all of this information, spectrum policy should is one of the easiest cases to make for common asset reform in the future."

## Who Owns Vermont's Rocks

*Ian Raphael*

"It is my belief that Vermont's wide array of stones and minerals fall into Paine's view of common property and that some sort of financial reparation should be made to the citizens of Vermont to compensate them for the excavation of this commonly shared non renewable natural resource," states Raphael in his introduction. He found that unlike Alaska, where the constitution states that the public owns the sub-surface resources, in Vermont mining companies pay only surface property taxes, and nothing to extract the minerals below. The mining industry is still governed by the Mining Act of 1872. He finds the value of minerals extracted in Vermont to be $96.8 million annually not including talc and slate, which are claimed to be proprietary. They do this on land valued at $132 million which means at the average property tax rate of 2.79% they are paying $3.7 million in taxes. Adding the property and annual mineral value Raphael finds that mining companies are only paying 1.6% of this total in property taxes. He also points out that when the minerals are gone, Vermont loses jobs, income, and gets a large clean up bill when all that is left are abandoned mines and environmental waste. Raphael recommends a royalty system of 10% on the value of minerals extracted, which is lower than oil royalties in Alaska of 12-15%. This would generate $9.7 million for a mineral trust fund. "Vermont needs to reclaim the rights to all its natural resources including minerals…By setting up a permanent fund to offset the extraction of non-renewable mineral resources, Vermont will ensure the prosperity of its amazing heritage and provide a current and future flow of revenue for its citizens."

## Scratching the Surface: An Analysis of Vermont's Surface Water Policy

*Elliot Wilkinson-Ray*

According to Wilkinson-Ray, "First we must acknowledge the fact that water is a Public Trust resource in the state of Vermont. Therefore, the legal property rights for all of the surface waters in Vermont are granted to the public… Although in practice 93% (roughly 445 million gallons per day) of surface water withdrawals in Vermont are by private companies without any mandatory compensation for the citizens to which that water belongs." Current private revenue consists of $35,000,000 for Public Supply, $1,692,350 for Wastewater Permits, $164,775,527 from Hydroelectric, $100,000,000 from Thermoelectric, and $109,096,309 for Recreation for a total of $410.6 million. Water utilities in Vermont currently charge on average $3 per 1,000 gallons of water to just cover their costs. Wilkinson-Ray contends that, "a higher price that included payments towards ecosystem restoration and protection would help curb wasteful water practices."

Ending the local hydroelectric subsidy would generate $6 million. Large hydroelectric facilities use 17.5 billion gallons of surface water per day, generating 578.5 megawatts peak. Hydro use of surface water is not considered "withdrawal". These facilities pay property taxes, but are too small to pay the Electric Energy Tax. Wilkinson-Ray suggests charging 10% on use of water for hydro in Vermont which would generate $16.5 million. The Vermont Yankee Nuclear powerplant is the largest single withdrawer of surface water in Vermont, drawing 421 million gallons per day, or 153 billion gallons per year for condenser and reactor cooling. This is 88% of the surface water withdrawals in the state. Wilkinson-Ray suggests a charge of 5c per 1,000 gallons, or 2% of the current wholesale water rate which would generate $7.6 million. For the public supply he recommends an increasing base structure, which would add approximately 10% of existing public revenue or $639,000. For other water use he prescribes a fee of 5c/1000 gallons, generating $438,000. The potential new revenue from water rental payments suggested by Wilkinson-Ray totals $31.2 million.

He concludes, "Even in a small state, water has a large economic role. Yet, the general public, who rightfully own this resource according to Vermont common law, are not the ones benefiting from its use and exploitation."

## Potential Revenue Through a Single Tax on Land

*Conor Casey*

In this essay Casey argues that while property taxes do collect some economic rent, they fail to collect all of it, and also conflate taxes on buildings with taxes on land. "Decoupling the land and building evaluations from the property tax rate would be a good start towards more effective rent collections…" He says that taxes should be economically efficient, eliminating deadweight losses, correcting perverse subsidies and generally promoting healthy economic growth. This he argues is accomplished by increasing taxes on land while reducing or eliminating taxes on buildings. He points out that median housing prices have increased by 5% annually since 1980, although from 2000-2007 the figure was 21.72% annually (before the recent housing bust). Using the long-term 5% figure as an estimate of economic rent would have yielded $1.07 billion in land tax revenue for 2007. This would be a 44% increase over the actual property tax revenue of $740,822,541 for 2007. Casey concludes, "Collecting economic rent from land is a perfectly viable way to fund most, if not all state obligations."

## Wind Rent: Possibilities

*Susan Skalka*

In this essay Skalka introduces the novel idea that wind blowing through the air, captured by wind turbines, like water flowing down a stream captured by hydroelectric dams, is a common asset that could generate revenue for the public. Should landowners be the only beneficiaries? She contrasts the "democratic theory of rent" where governments should maximize their collection of rent to benefit the public, with the currently operating "liberal theory of rent", where public resources are made private and rent remains in private hands. She recommends we encourage the nascent wind industry, but keep in mind the possibility of monopoly rents in the future, which should be recovered for the public. Skalka discusses the possibility of using a progressive profits tax as a model for how economic rent could be adjusted. If we installed 225MW of wind power generating 10% of Vermont's electrical power, wind could generate from $6.9-$172.5 million in economic rent in the future, depending on the price of electricity.

## Summary

This report provides a new way to look at public revenue, focusing on collection of economic rent from use of the commons, rather than taxation of value added. Economists insist that collection of unearned economic rent does not distort the productive economy or discourage investment, while taxation of earned income does. This should appeal to all sides of the political spectrum. Less taxation of earned income should appeal to conservatives; charges for depletion, land use and pollution should appeal to greens; and more equitable distribution of revenue should appeal to liberals.

The total new potential revenue is estimated to be about $1.2 billion (see chart) which equals nearly half of Vermont's 2008 instate revenue of $2.84 billion (Joint Fiscal office). Of the assets described in this report, only minerals are a non-renewable resource subject to depletion. This warrants a permanent fund similar to Alaska to replace the resource when it is gone, and manage environmental restoration and cleanup. Most of the other resources are renewable and could generate revenue on a continual basis in perpetuity. Economic rent could be distributed annually. Pollution fees such as carbon permits are a special case since the tax base may decline over time. What revenue to put in a permanent fund and what revenue to distribute is a question for future research and debate.

If $1.2 billion in annual revenue were distributed equally to all 623,050 (2005 estimate) Vermont residents, this would amount to $1972 per person annually. If we believe that the natural and social assets of Vermont belong to Vermonters, then it is imperative to recapture this value and return it to all the citizens of Vermont rather than leaving it in a few private hands. At the same time, this provides less justification for taxation of earned income on value added. Current owners and users of Vermont's assets who would be affected by this revenue system will undoubtedly deny they are accruing any unearned income, and will claim that all of their income is earned. For that to be true, the water, minerals, airwaves, air and other resources of the state would have to be worth nothing which we have clearly shown is not the case. We hope this report will stimulate discussion about new ways to collect public revenue, particularly in these tough budgetary times.

## Estimate of Total Revenue Potential from Common Assets in Vermont

| Asset | Current Revenue (Million $) | Potential New Revenue (Million $) | Increase (Million $) | Source |
|---|---|---|---|---|
| **Air/transport** | 209 | 7-153 | 7-153 | carbon permits |
| **Air/heating** | 17 | 4-93.6 | 4-93.6 | carbon permits |
| **Air (total)** | 0 | 25.9 | 25.9 | carbon permits |
| **Fish and Wildlife** | 14.7 | 10.4 | 10.4 | fees |
| **Forests** | Net loss | 3.2 | 3.2 | depletion fees |
| **Ground Water** | ~0 | 107.9 | 107.9 | bottlers |
| **Internet** | ~0 | 30 | 30 | ISPs & domains |
| **Spectrum** | ~0 | 375 | 375 | annual auction |
| **Minerals** | 3.7 | 9.7 | 6 | royalties |
| **Surface Water** | ~0 | 31.2 | 31.2 | user fee |
| **Land** | 741 | 1071 | 330 | land rent |
| **Wind** | .75 | 5.5 | 4.75 | progressive rent |
| **Speculation*** | (capital gains?) | 269 | 269 | .25% Tobin tax |
| **Seignorage*** | ~0 | 35.7 | 35.7 | 1% of loans |
| **TOTAL NEW REVENUE** | | | $1.229 billion/year | |
| **PER CAPITA DIVIDEND** | | | $1972 each/year | |

** Note: The Stock and commodities markets are socially created common assets, as is the monetary system. The right to create money is a government privilege granted to the private banking system, which creates 93% of the money in the US through loans. Potential revenue from speculation and monetization (seigniorage) were estimated in a previous UVM study. A Tobin tax of .25% was applied to all financial speculation. Economic rent of 1% was applied to all bank loans, which represent money creation.*

# Renting the Air: Curbing Emissions from Transportation and Heating in Vermont

*by Jennifer Kenyan, Beth Nolan*

***Consider, for example, our atmosphere. It's not just today's pollution that hurts, it's the accumulation of fumes we've been pouring into the air for centuries. This has already caused ice caps to melt, hurricanes to gain ferocity, and the Gulf Stream to weaken. Almost universally, the world's scientists warn that far worse lies ahead. The question our generation faces is: will we change our economic system voluntarily, or let the atmosphere change it for us?***

— Peter Barnes, *Capitalism 3.0*

Greenhouse gas emissions from heating of residential and commercial buildings and emissions from transportation constitute 27% and 44% of total Vermont emissions, respectively. Global climate change and its impacts can be traced back to these emissions and their sources. As Vermont and neighboring states take proactive steps and collaborate to curb emissions from the industrial sector through the Regional Greenhouse Gas Initiative, the need to curb emissions from the residential, commercial, and transportation sector remains unfulfilled. This paper will examine potential ways to protect our common asset, the air, through economic incentives.

## The Regional Greenhouse Gas Initiative: An Overview

The Regional Greenhouse Gas Initiative (RGGI, pronounced ReGGIe), which began in April 2003, is an agreement among the Governors of ten Northeastern and Mid-Atlantic States (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Jersey, New Hampshire, Rhode Island and Vermont) to reduce the emissions of greenhouse gases from power plants. The RGGI model was developed through the collaborative efforts of energy and environmental agencies, research organizations, stakeholder participation, and state officials. The program components included in the Memorandum of Understanding (MOU) signed by the ten states set a start date for the cap-and trade-program of January 1, 2009. The program covers fossil fuel fired electric generating units of 25 megawatts and larger and consists of a cap: to stabilize current emissions through 2014, and reduce emissions by 10% thereafter by 2018. It should be noted that the stabilizing cap point starts at 4% above the average 2000-2004 annual emissions. The program also includes a comprehensive review in 2012.

The emissions allowances under RGGI will be distributed to sources, or otherwise into the open emissions market, by each participating state, as the state deems appropriate. The states have agreed that at least 25% of the emissions allowances will be allocated to a "consumer benefit or strategic energy purpose," although in Vermont 100% was designated for the benefit of energy consumers. This means that revenue from the sale of at least 25% of the allowances will be used to support energy efficiency, renewable energy, innovative energy technologies or consumer rebates. This sale of allowances may be achieved through an auction, although states will have discretion in the specific method used for distributing this portion of allowances.[1]

In March 2008, RGGI released the "Design Elements for Regional Allowance Auctions." The initial auction is currently planned for September 10, 2008 with a second auction scheduled for December 17, 2008. Allowances will be made available for sale on a quarterly basis in lot sizes of 1,000 allowances. The initial auction will offer allowances through a single-round, uniform-price, sealed-bid auction format. All market participants will be eligible to participate in the initial auction, provided they meet applicable qualification requirement, which will include provision of financial security. A reserve price of $1.86 per allowance will apply to the first auction. Any unsold allowance will

be made available for sale in future auctions in which a reserve price based on the current market price is being used. The participating states will retain a professional independent market monitor to monitor auctions and subsequent market activity.[2] [Oct. 2008 update: the first auction resulted in an auction price of $3.07 per ton of carbon]

The RGGI program is expected to have modest price impacts. Using natural gas price projections widely accepted by industry analysts, regional average retail price increases range from 0.3% to 0.6% in 2015, across all rate classes. Even under a "high gas price" scenario using gas prices that are higher than mainstream analysts expect, projected retail electricity price impacts range from 1.7% to 3.2% in 2015, across all rate classes. Projected direct electricity bill impacts due to RGGI range from $3 - $16 per average household annually in 2015.

In the future, RGGI may be extended to include other sources of greenhouse gas emissions, and greenhouse gases other than $CO^2$. After the cap-and-auction program for power plants is implemented, the states may consider expanding the program to other kinds of sources.[3] In 2008, the Vermont State Legislature considered in an early version of bill S. 350, to expand the RGGI trade program to include all significant sources of greenhouse gases, ideally in coordination with comparable efforts in surrounding states.[4]

## Managing Transportation Emissions to Protect our Common Asset

*From the age of the dinosaurs*
*Cars have run on gasoline*
*Where, where have they gone?*
*Now, it's nothing but flowers*
— Talking Heads, "Nothing But Flowers"

Currently, Vermont captures revenue from the transportation sector through the gasoline tax, the diesel fuel tax, motor vehicles fees, purchase and use taxes, and various other small revenue mechanisms (there is also a gas tax collected at the national level and redistributed to the states through the Federal Highway Administration and Mass Transit Account). In 2005, the total revenue collected from these fees was $209 million dollars. But these revenues do not capture the amount of rent collected by oil companies who made a reported $123 billion in profits in 2007. Nor do these revenues go toward protecting the air from transportation emissions, and the subsequent consequences associated with emissions as previously discussed. Revenues are placed in the Vermont Transportation Fund and allocated for costs such as road, bridge, and culvert maintenance and repair, overhead for the Vermont Transportation Agency, and road, bridge, and culvert construction.

## Structure of a Cap and Dividend Program for Transportation Emissions

In addition to a cap and trade (actually cap-permit/auction-trade) system for $CO^2$, Peter Barnes and others have proposed the concept of cap and dividend (Cap-permit/auction-trade-dividend). The concept is that some of the revenue from auctioning carbon permits should be distributed to the public as a dividend, due to the atmosphere being a commons that should be shared. In order to have a successful cap and dividend program for transportation emissions and ensure public buy-in, the Regional Greenhouse Gas Initiative is an excellent model to follow. It has already resolved questions regarding what a model would look like, how to maximize stakeholder participation, and how a cap on industrial emissions would work best on a regional level. The RGGI cap-and-trade program has been well supported by the 10 states participating in RGGI and was created through a multi-year planning process with representation from each RGGI state. And, perhaps most importantly, RGGI recognizes the necessity of implementing a carbon emissions reduction plan collaboratively to protect the states from economic, political, and social repercussions. It is logical, then, that other air emissions programs would follow a similar design, both for ease of implementation and to ensure support from participating states.

Upstream rent collection is the most efficient and encapsulating point, and in Vermont, the distributors are the most upstream point for rent collection because they bring the fuel Vermonters use into the state and are the highest level of revenue collectors accessible to administrators. Therefore, it makes sense that the auction participants would be mainly distributors, although the auction would be open to the general public, just like RGGI.

In Vermont, the gasoline and diesel taxes are collected from distributors who import gas or diesel fuel into the state. Distributors must receive a license from the Department of Motor Vehicles, and then each month report the number of gallons distributed to retailers and the respective tax collected. The gas and diesel taxes are passed from the distributor to the retailer to the consumer. In Vermont, there are 142 licensed diesel fuel distributors and 100 licensed gasoline distributors. The 10 largest gasoline distributors in terms of sales during calendar year 2007 were A. R. Sandri Inc., Champlain Oil Co. Inc., Cumberland Farms Inc., D&C Transportation Inc., Irving Oil Terminals Inc., Midway Oil Corp., R. L. Vallee Inc., S. B. Collins Inc., Summit Distributors LLC, and Wesco, Inc. Sales from these 10 distributors accounted for approximately 74% of the fuel tax revenues in Vermont. 30 of the distributors licensed to do business in Vermont reported no sales in 2007.[5]

In order to ease the public and private sectors into

the cap-and-dividend system, the initial emissions cap on transportation should be similar in structure to the RGGI system. It would initially determine the current emissions from transportation and then keep emissions at that rate during the initial years. Permits would determine how many gallons of gasoline and diesel could be brought into the states and region for retail consumption. Then, after a review process, administrators and working groups could determine the appropriate decrease of permits available to distributors in the region. (It is important to note that while permits would regulate the number of gallons brought into and sold in Vermont or the region, the number of permits available would be based on the tons of GHG emissions allowed as determined by scientists, economists, and administrators. But because emissions are coming from mobile source points, we must trace emissions up the ladder to the actual gallon amount of fuels sold.) From there, the auction structure for permits would be similar to the RGGI model, with quarterly auctions. One question working groups would have to consider would be the possibility for offsets— would distributors be able to allowed more fuel permits if there was an offset option involved as in RGGI? How would this affect the regional attempt to curb emissions? These questions are outside the scope of this paper, but will be important questions to consider in the future.

One question that might concern consumers and citizens is that a cap on transportation fuels might cause the price of gas and diesel to skyrocket, hurting not only their pocketbooks, but also local and regional businesses, as transportation is a cornerstone of our economy. This is unlikely because the rent collected from the permit auction would be invested in a trust fund much like the Alaska Permanent Fund, consumers would receive a *monthly* dividend to offset any increased costs, and ensure that the auction does in fact reflect rent collection and not an increased tax. A cap on fuels would encourage drivers to drive less, because by reducing their own consumption, they will be able to use their dividends for other purposes (and subsequently spur the economy). Furthermore, the permit system would have wide public support because as the number of permits is ratcheted down, the money fetched through permit auctions will increase, and so too might the dividends citizens receive.

Another concern might be that a cap on fuels leads to gas rationing. This is a valid concern, but we would first note that a ratcheting down of available fuels would not occur for several years, and as the current price of gas steadily increases, many consumers are taking action on their own to decrease their consumption because transportation fuels are simply unaffordable. We would also counter that gas rationing is going to happen at some point, one way or the other. Fossil fuels are a renewable common asset, but the renewal rate is hundreds of millions of years. That means it will take generations before fossil fuels are a viable energy source again, and we are currently running out. Whether a gas ration happens in 5, 10, or 15 years because we are running out of fuel; if it happens because oil companies keep oil in the ground for speculation purposes, or because of a cap on emissions, gas rationing may very well be in our future. By putting a cap on fuels now, we not only take a proactive stance on how we use our fuel, we also prolong the length of time we will be able to use fossil fuels.

Still, our current transportation system relies on personal vehicles and trucking to move people

**Transportation Emissions in Vermont**
*(January- December, 2005)*

| | Total Gallons Sold | Carbon Dioxide million metric tons, (mmt) | Other Green-house Gases (mmt) | Total Emissions (mmt) |
|---|---|---|---|---|
| **Gasoline** | 361,189,501 | 3.024 | . 126 | 3.15 |
| **Diesel** | 67,958,216 | .64 | .03 | .67 |
| **Total** | **429,147,717** | **3.664** | **.156** | **3.82** |

**Potential Rent Collection from Permit Auction**

| | RGGI ($1.86) | British Columbia ($10) | European Union[6] ($40) |
|---|---|---|---|
| **Gasoline Emissions: CO2 (3.024 mmt)** | $5,624,640 | $30,240,000 | $120,960,000 |
| **Gasoline Emissions: Other GHG (.126mmt)** | $234,360 | $1,260,000 | $5,040,000 |
| **Diesel Emissions: CO2 (.64 mmt)** | $1,195,980 | $6,400,000 | $25,600,000 |
| **Diesel Emissions: Other GHG (.03 mmt)** | $49,848 | $300,000 | $1,200,000 |
| **Total Rent** | **$7,104,828** | **$38,200,000** | **$152,800,000** |

and goods. As the cost of maintaining our current transportation infrastructure is increasing, the gas tax is predicted to be a viable funding source for transportation only until 2025. We face a transportation crisis on many levels, and the current structure is not sustainable. Another benefit of the transportation trust fund is the numerous consumer benefits that can be derived from it. For example, we could use the rent collected in the permit auction to invest in alternative transportation options. Is a light rail system in Vermont a possibility? Could our region increase the number of smart growth communities? Improved mass transit systems? What about yearly tax rebates for people who drive low-emission, hybrid vehicles? Car-share services? What other innovative transportation systems could we create if only we had the means to do so? These possibilities could be researched, developed, and funded through the transportation trust fund.

Through RGGI, Vermont received 1,225,000 permits for the cap-and-trade auction. Of this, Vermont only "needs" 50,000 to cover our own power plant emissions, or 4% of the total allotment. Vermont's industrial emissions are significantly lower than the other states involved in RGGI: not the case for our transportation emissions. The transportation sector accounts for 44% of emissions in Vermont, compared to 26% nationally, and continues to grow by 1.1% per year with a largely rural population and no major mass transit planning in the near future[7]. Based on current emissions using the RGGI auction reserve price of $1.86 would generate $7.1 million. But we now know this was an underestimate since the Sept. 2008 RGGI auction price was $3.07/ton. This would generate $11.7 million from transportation emissions. On the other hand, with the steady rise of gas prices, decreasing numbers of vehicle miles traveled per capita, increased fuel efficiency of cars, and a growing number of car sales, it is difficult to predict what will happen with transportation emissions.

> *So how do you change paradigms? ...In a nutshell, you keep pointing at the anomalies and failures in the old paradigm, you keep speaking louder and with assurance from the new one, you insert people with the new paradigm in places of public visibility and power. You don't waste time with reactionaries; rather you work with active change agents and with the vast middle ground of people who are open-minded.*
>
> — Donella Meadows
>
> "Leverage Points: Places to Intervene in a System"

The absorptive capacity of the air is quickly reaching a tipping point, and the health and environmental consequences will be catastrophic, as we have seen from events like Hurricane Katrina, and the rise of asthma rates among children. The transportation infrastructure in the United States is at a crossroads on many levels, as well. Whether because of our infrastructure conditions, our failing ability to maintain the infrastructure, our unsustainable use of fossil fuels we are at a focusing point in history to envision the future of transportation. The transportation cap-and-dividend system, and the creation of a trust fund to manage it should be integral parts of this future. In doing so, these programs will revolutionize the way we think about the air, the atmosphere, and their relationship to transportation. It will create a realistic and practical way to curb emissions from the transportation sector, and it will have huge buy-in from the community who will also begin to take responsibility for their contribution to pollution.

## Emissions from Heating of Residential and Commercial Buildings

Heating of residential and commercial buildings is responsible for 27% of greenhouse gas emissions in Vermont. There are two main fuel sources used for heating: natural gas and heating oil. Natural gas is carried throughout the United States through an intricate system of pipelines that cross state borders and connect in regions to major distributors. Unlike almost anywhere else in the country, Vermont has only has one pipeline crossing into its territory. This pipeline enters in across the Vermont-Canada border and only travels as far south as Chittenden County. Therefore, only residential and commercial buildings in Chittenden County and locations north of it have the option of using natural gas to heat their business or home. Additionally, there is only one provider in Vermont from which an individual or business can receive their natural gas from: Vermont Gas Company. Vermont Gas owns the rights to the pipeline that enters from Canada and therefore has full claim to the distribution of the heating source.

In the remaining areas of Vermont, most individuals heat their home or business through some form of heating oil. These heating oils are brought into the state by over 120 retail distributors who can sell heating oil to various commercial and residential buildings directly. The retail distributors may have a tanker truck or storage tanks that have the capacity to hold fuel, and can buy the oil from wholesale distributors such as Valero (who is the largest distributor to Vermont). If retailers do not have tanker trucks or storage tanks, they contract out to "jobbers" who go to the distributor for the retailer and bring oil to the retailers, who can then sell heating oil to residential and commercial buildings. It is often difficult to determine which wholesalers, retailers and jobbers to go to in order to obtain heating oil. In fact, it can be the case that a retailer is also a wholesaler, and wholesalers can be anyone from Morgan Stanley (who currently has the largest tanker storage for the Northeast region) to Exxon-Mobil. The industry is largely

unregulated when it comes to distribution, as there is no formal governmental permitting or licensing process for distributors. While the Vermont retailers are fairly well known, it is nearly impossible to determine all the wholesalers they buy from without interviewing each individual retailers, especially when wholesalers can be in any state.

## Current Management and Revenue of Heating Oil

Currently, there is no real management structure in place for distributing or selling heating oil. Besides the regulation of what steps a trucker must take before getting into the truck or how the truck should be labeled, heating oil has minimal oversight requirements. People in the business of distributing heating oil, or in other words the 120-plus retailers, are required to register with the state of Vermont and get a resale number. The retailer receives a booklet of "coupons" which have information about their distribution on it and gives them permission to sell heating oil.

Two taxes are levied on heating oil. The first is a half-cent per gallon tax on storage tanks, which goes directly to the petroleum clean up fund. The other tax is a half of one percent of the fuels gross receipts tax, which goes directly to a weatherization subsidy program for lower-income individuals. Otherwise, all heating and electricity used for the direct or indirect manufacturing of goods, farming, or residential buildings, are exempt from all sales and use taxes.

## Future Management of Heating Oils

As the system is structured currently, the unearned income we call rent is being left in the hands of the polluters. Two options seem feasible to shift the rent and reduce pollution.

### Option One

The first option is to capture the rent as far upstream in the pollution ladder as is possible. In the case of heating oil in Vermont, this would have to be the 120-plus retailers of heating oil. Capturing rent at the wholesale level would prove to be ineffective because we currently have a system that does not regulate or keep track of wholesalers. Rather, we should require retailers of heating fuels to purchase carbon permits. Since the retailers already are required to purchase permits to sell the fuel, a management structure will not need to be created. When retailers purchase sale permits, they would also be required to purchase carbon permits. The cost of the carbon permits would be based on the profits they earned from the number of gallons of fuel they sold to residential and commercial buildings for heating in the previous year. Peter Barnes, the well-known advocate of carbon emissions reduction, indicated that 3% of Gross Profit would be an appropriate percentage of unearned income to consider a rent collection. Therefore, it seems reasonable to require that 3% of last year's earnings for each retailer be the price of the carbon permit. When the retailer registers with the state, they will have to bring evidence of their past years earnings and produce 3% of those earnings to purchase the following year's carbon permit.

The same model could be used for natural gas as well. Vermont Gas would have to purchase a carbon permit also based upon 3% of their last year's earnings. For example: if a retailer earned $100,000 last year from the sale of heating fuel, they would be required to pay $3,000 for the carbon permit for the next year. This would encompass the rent on the unearned income above the reasonable earnings profit.

As may be obvious, the advantage to this form of rent is that it is progressive rather than regressive. For those retailers who did not sell as much heating oil as their competitors, they will not be required to pay the same amount. Additionally, the carbon would be based on real earnings rather than speculation since it will be collected for the year that just passed.

### Option Two

Replicate the British Columbia (B.C.) model in which a carbon tax is levied on consumers and businesses. In B.C., the tax on heating oil is expected to start at 2.7 cents per liter and increase to 8.2 cents per liter over the next five years. The revenue from the tax will return to taxpayers in the form of income and business tax cuts, as well as a one-time $100 dividend for every citizen and an annual dividend of $100 per adult and $30 per child for lower-income citizens (Canadian Press, 2008).

In Vermont, a carbon tax could be based on a set amount per gallon of heating oil. Since a 0.5% fuel gross receipts tax, a .3% utilities gross receipts tax, and a 5% sales tax on commercial energy are already levied on commercial and residential heating fuels and natural gas, the rates could just be increased by an amount deemed suitable and appropriated as rent collection. It may even be fitting to consider the B.C. model for the calculation of rent in Vermont. If two and a half liters equals one gallon and B.C. has a 2.7 cents per liter rate on heating fuel, it would be logical to multiply the 2.7 cents by two and a half, thus equaling one gallon at 6.75 cents, eventually resulting in a carbon tax of 20.5 cents per gallon of heating oil or natural gas after five years. The hope is that with the increase in cost to pollute, residents and businesses will be more aware of their contributions to polluting the air and reduce the types of consumption that lead to pollution.

## Revenue Potential from $CO^2$ from Residential and Commercial Fuel Use

Looking at residential heating fuels in Vermont-including oil, natural gas, coal, wood, and electricity-we find that total $CO^2$ emissions amount to 2.12 Million Metric tons per year (This does not include kerosene or LPG). We can apply the same principle used in the case of transportation emissions to calculate potential revenue based on $CO^2$ emissions, and various possibilities of carbon price per ton. Based on the same three revenue models of RGGI auction reserve price, British Columbia carbon tax, or European carbon auction price we get potential revenue of $3.9 million, $21.2 million, and $84.8 million, respectively.

Commercial fuel use is somewhat lower with total carbon emissions of 1.09 million metric tons. This leads to potential revenue of $2.03 million at $1.86/ton, $10.9 Million at $10/ton, and $43.7 million at $40/ton. Combining residential and commercial $CO^2$ revenue potential results in $5.9, $32, or $128 million potential. Which number is likely to be correct? We have already seen the first RGGI auction lead to a price of 3.07 per ton or carbon. The European auction currently has a price of $40/ton. Depending on the severity of perceived need for carbon reduction, it is not unlikely the US could see carbon prices per ton at the European level within a few years.

**Potential Rent Collection for Residential Fuels from Permit Auction**

| | RGGI ($1.86) | British Columbia ($10) | European Union ($40) |
|---|---|---|---|
| Coal (.0003 mmt) | $558 | $3,000 | $12,000 |
| Petroleum (1.45) | $2,697,000 | $14,500,000 | $58,000,000 |
| Natural Gas (.16) | $297,600 | $1,600,000 | $6,400,000 |
| Wood (.03) | $55,800 | $300,000 | $1,200,000 |
| Electricity: System Purchases (.24) | $446,400 | $2,400,000 | $9,600,000 |
| Electricity: Historical Mix (.24) | $446,400 | $2,400,000 | $9,600,000 |
| **Total Rent** | **$3,943,758** | **$21,203,000** | **$84,812,000** |

**Potential Rent Collection for Commercial Fuels from Permit Auction**

| | RGGI ($1.86) | British Columbia ($10) | European Union ($40) |
|---|---|---|---|
| Coal (.002) | $3,720 | $20,000 | $80,000 |
| Petroleum (.51) | $948,600 | $5,100,000 | $20,400,000 |
| Natural Gas (.14) | $260,400 | $1,400,000 | $5,600,000 |
| Wood (0) | $0 | $0 | $0 |
| Electricity: System Purchases (.22) | $409,200 | $2,200,000 | $8,800,000 |
| Electricity: Historical Mix (.22) | $409,200 | $2,200,000 | $8,800,000 |
| **Total Rent** | **$2,031,120** | **$10,920,000** | **$43,680,000** |

## Total Revenue from $CO^2$

According to the Governors Commissions on Climate Change, the total $CO^2$ equivalent emissions in Vermont, NOT including electric consumption is 8.44 Million Metric tons. At the recent auction price of $3.07 this would generate $25.9 million. At the BC price of $10/ton it would generate $84.4 million, and at the European price of $40 this would be $337.6 million. Of course we have not included the response of permit prices to reduction in demand due to any price increase imposed by the permit costs or any carbon tax. The future price of carbon is unknown, but if the carbon quota is decreased then the price is likely to be higher in the future.

## Protecting our Air as a Common Asset

Since any rent collected is certain to be shifted through costs to consumers, it is especially important to consider how the consumer will benefit from a reduction of carbon emissions. Regardless of whether the appropriate avenue to take in Vermont is option one or option two, a portion of the rent, potentially 50% of it, should be shifted back to the consumers in the form of a quarterly dividend for every individual. Additionally, the other 50%, split 25% by 25%, should be invested in the research of alternative fuels and the subsidization of using those alternative fuels for residential and commercial heating. The ultimate goal is to reduce carbon emissions and therefore, not only do we need to provide an incentive to reduce

**$CO^2$ Emissions in Vermont**

| Source Categories | Emissions (MMtCO2e) 2005 | 2030 (high) | 2030 (low) |
|---|---|---|---|
| Electricity Consumption | 0.64 | 4.12 | 0.97 |
| Residential, Commercial, Industrial Fuel Use | 2.71 | 2.72 | 2.72 |
| Transportation | 4.02 | 3.64 | 3.64 |
| Fossil Fuel Industry | 0.02 | 0.03 | 0.03 |
| Industrial Processes | 0.44 | 1.24 | 1.24 |
| Waste Management | 0.29 | 0.23 | 0.23 |
| Agriculture | 0.96 | 0.9 | 0.9 |
| **Emissions Total** | **9.08** | **12.88** | **9.73** |
| **Minus Electricity** | **8.44** | | |

*Statewide data from Vermont Governors Commission on Climate Change, available at: www.uvm.edu/~vtcc/?Page=governor.html*

personal footprint, but we must also prepare for the day when these various heating sources are no longer sustainable. Using a portion of the rent to shift behavior to alternative fuels that eliminate pollution is ideal.

One reoccurring concern throughout this attempt to calculate rent is that there are gaps in the information available to consumers and government alike. The lack of regulation of heating oil wholesalers are creates a system in which uncertainty is guaranteed to create a gap in capturing the true amount of rent. Before we can begin to capture rent, we must have full access to information on this industry. Without knowledge of all the wholesalers selling to Vermont, we are surely losing some of the unearned income that they put into their pockets.[8]

## Next Step: Pass S.350

Currently (spring 2007), the Vermont legislature is considering bill S.350, which includes two major components that will improve our ability to manage the air as a common asset. The first is to "establish an inventory of greenhouse gas emissions and sinks, and to require reporting of certain emissions and the development of a regional greenhouse gas registry" in order to track the balance of greenhouse gas emissions and sequestration in Vermont. The second major component of the bill "proposes to expand the RGGI cap and trade program to include all significant sources of greenhouse gases, ideally in coordination with comparable efforts in surrounding states."

S.350 also proposes to amend Act 250 (The Land Use and Development Act) to support multimodal transportation capabilities; to support alternative modes of transportation including passenger, rail, and public transit; to upgrade the state's residential and commercial building codes; and to require the development of minimum building efficiency standards that must be met at the time of property sale.

The bill proposes to increase registration fees for new cars that get a low number of miles per gallon, to decrease the purchase and use tax for certain efficient vehicles, and to assess a surcharge on the purchase of certain inefficient new vehicles.

We recommend that the Vermont legislature pass S.350, especially those components that extend the scope of RGGI to all sources of all greenhouse gases on a regional level.

## Conclusion

Any program that would protect the air as a common asset must be politically feasible. Legislators must be able to go back to their constituents certain that they did the right thing. It is easy to say that RGGI is beneficial for everyone and that consumers will feel the benefits of this cap-and-auction system through a subsidized weatherization program; but it will not matter if citizens do not see tangible results, and ultimately hold the benefits in their hands. If we change the current RGGI structure to include a dividend for each individual, then we are physically producing the benefit for each individual to hold in his/her hand, providing the opportunity for legislators to show that they have done something for their district, but we are also eliminating the cost-shifting reaction of polluters. If the rates consumers must pay increase, the regressive effects can be mitigated as long as there is a dividend to offset the cost to the consumer. In a cap-and-dividend system, we are regaining our property, reducing air emissions, putting money back into the hands of the consumers, and ultimately, continuing to stimulate our economy.

[1] "Frequently Asked Questions" updated 3/23/3006, http://www.rggi.org/about.htm, March 15, 2008.

[2] "Design Elements for Regional Allowance Auctions under the Regional Greenhouse Gas Initiative," www.rggi.org, retrieved March 17, 2008.

[3] http://www.rggi.org/about.htm, retrieved March 15, 2008.

[4] Vermont State Legislature, retrieved from http://www.leg.state.vt.us/database/database2.cfm, S.350.

[5] Information provided by Howard Deal, Deputy Commissioner of the Vermont Department of Motor Vehicles.

[6] European Carbon Exchange, http://www.europeanclimateexchange.com/default_flash.asp, retrieved April 21, 2008.

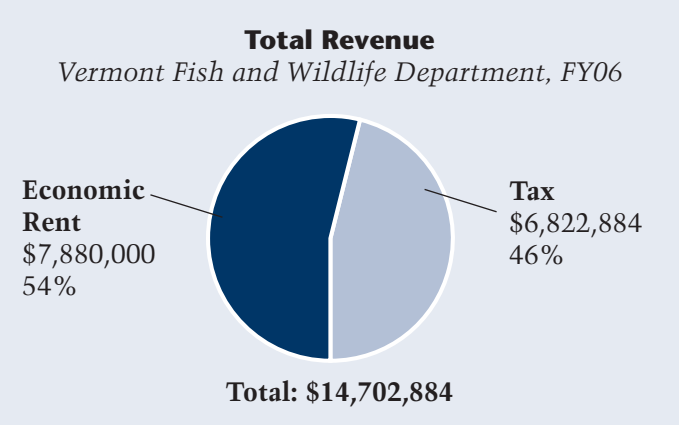
[7] Final Vermont Greenhouse Gas Inventory and Reference Case Projections, 1990-2030. Center for Climate Strategies, September 2007.

[8] All information depicted in this paper is the result of interviewing an employee of the Vermont Department of Taxes and the Vermont Fuel Dealers Association.

# Current and Potential Economic Rent in the State of Vermont: Wildlife and Fish

*by Ross Saxton*

Of the $14,702,882 of revenue received by the Vermont Fish and Wildlife Department in FY06, about $7,880,000 is economic rent. The other approximately $7 million is the result of taxes *(see pie chart at right).*




The revenue derived from hunting, fishing, and trapping licenses is pure economic rent. Besides the minor costs for the paper and stickers going into the physical licenses, everything else is unearned profit by the state of Vermont. The general fund provides approximately $1 million of economic rent to the Fish and Wildlife Department. Although the revenue generated by the general fund is about $2.1 million, a "substantial" amount is created through taxes such as sales tax, use tax, corporate tax, tobacco tax, alcohol tax, banking tax, and the most sizable, income tax (Jason Aronwitz, direct contact). The economic rent derived from the general fund is estimated to be $1 million, which is statistically the most accurate approximation due to the unknown ratio of rent-to-tax within the general fund. Other departmental income provides the Fish and Wildlife Department $621,871 of economic rent. The rent comes from leases on agriculture lands and camps on wildlife management areas, sales of timber, dog licenses, grants from the Vermont Association of Snow Travelers (VAST) and Vermont All Terrain Vehicle Association (VASA), and tuition from conservation camps (Sher Yacono, direct contact). Federal funds categorized as "other" produce $363,787 in rent. These are received as grants from organizations such as the National Oceanic and Atmospheric Association (Sher Yacono, direct contact). Boat registrations also produce rent for the Fish and Wildlife Department. $243,617 is created by selling mandatory permits to motorized boat owners so they can use their boats in Vermont waterways. The sales of conservation license plates produce $125,986 in rent for the Fish and Wildlife Department. The income tax check-off box produces $99,710 in rent. Being donations, this is all unearned income. Duck stamps are similar to hunting licenses, contributing $16,169 of rent to the Vermont Fish and Wildlife Department (Vermont Fish and Wildlife Department). *(See table at left for a summary of this paragraph.)*

**A breakdown of tax vs. economic rent within total revenue of the Vermont Fish and Wildlife Department.**

| | | |
|---|---|---|
| License Fee Revenues | $5,409,130 | ALL |
| Federal Funds, USFWS | $4,928,390 | NONE |
| General Fund | $2,101,771 | $1,000,000 |
| Other Departmental Income | $621,871 | ALL |
| Gas Tax | $592,453 | NONE |
| Federal Funds, Other | $363,787 | ALL |
| Boat Registrations | $243,617 | ALL |
| GF, Rooms and Meals | $200,000 | NONE |
| License Plate Sales | $125,986 | ALL |
| Income Tax Check Off | $99,710 | ALL |
| Duck Stamp | $16,169 | ALL |

The approximately $7 million that is not rent is comprised of various taxes. Federal funds provide no rent to the Fish and Wildlife Department because its revenue is entirely taxes on goods brought in from the Pittman-Robertson Act (taxes on guns and ammunition) and the Dingle-Johnson Act

(taxes on fishing equipment). Other major taxes include a gas tax, and meals and room taxes, as well as the previously mentioned taxes in the general fund.

Hunting, fishing, and trapping sales in Vermont and many other states have been consistently decreasing, leaving total revenues and economic rent production at a decreased level every year. In order to address this problem, a plan to increase the Fish and Wildlife Department's funding has been introduced before the Vermont legislature. The plan intends to redirect 1/8 of one cent from the Vermont sales tax to the Fish and Wildlife Department. An estimated $6-7 million would be brought into the department's funds- a total revenue increase of nearly fifty percent. This would not cause an increase in economic inefficiency since the tax is redirected from other departments. Taxes would not be increased, nor would there be an increase in deadweight loss between consumers and producers. If the 1/8 of one-cent plan passes legislation, the Fish and Wildlife Department's total revenue would be approximately $21 million, of which 38% would be economic rent. Activities related to fish and wildlife in Vermont generates an estimated $386 million a year (Fish and Wildlife Department Funding Task Force, 2007). From this, it is obvious that the Fish and Wildlife Department should receive a more representative amount of funding that is derived from sources such as sales taxes.

A current method of funding acquisition for the Vermont Fish and Wildlife Department is the Fish and Wildlife Trust Fund. The department may only use interest that is gained annually. For instance, the department collected $139,000 from the fund at the end of FY07 (Sher Yacono, direct contact). As the fund had a total of $1,655,386 in it at the time, the interest rate was about 8.4%. The Fish and Wildlife Trust Fund has huge potential for economic rent as a larger proportion of total revenue. For example, if the fund was increased to $12 million and the interest rate remained the same as in FY07 (8.4%), the Fish and Wildlife Department would be able to use $1,008,000, which could increase the current total revenue by about 6.8%. Over ten years, the trust fund containing $12 million would generate over $10 million for the department, assuming the interest rate is still 8.4%. With the same interest rate, the initial investment of about $11.5 million would be surpassed in rent (revenue) generated by the trust fund in approximately 10 to 11 years.

According to the Vermont Earth Institute, Vermont's rural population grew by 59% between 1960 and 1990, while the urban population grew by 21%. Rural population growth means that there must be the development of houses on what was before agricultural land, wetlands, meadows, or forested land. With this in mind, as well as the Fish and Wildlife Department's need for further funding, a biodiversity and land conservation plan needs to be developed and implemented for the state of Vermont, as well as for other states and countries. This plan creates a permit system where an individual or corporation has to pay to use a certain land parcel (e.g. development, logging, mineral extraction, etc.), but the price of the payment is determined by the habitat type that the land is encompassed within. The habitat type (for example, habitat type 1) is established on a basis of the number of species that inhabit it (see Figure 1). Further more, the scarcer the species, the more valuable that habitat is according to the permit system. The species scarceness can be determined from the existing list of Species of Greatest Conservation Need, developed by the Vermont Fish and Wildlife Department. These habitats inside the habitat type scheme are called "critical habitats".

An equation comprised of numerous factors will be created to determine the designation of each habitat type. Factors in a habitat will include the following: number of different species, number of populations of each species, scarcity of species regionally and globally,

**Critical Habitat Types**

| Habitat Type | Description of Habitat Type | Cost of Permit |
|---|---|---|
| 1 | Most biodiversity; most number of scarce species | Highest ↑ $$$$$$$$$$ |
| 2 | Less biodiversity, number of scarce species than habitat type 1 | ↑ $$$$$$$$ |
| 3 | Less biodiversity, number of scarce species than habitat type 2 | ↑ $$$$$$$ |
| 4 | Less biodiversity, number of scarce species than habitat type 3 | ↑ $$$$$$ |
| 5 | Less biodiversity, number of scarce species than habitat type 4 | ↑ $$$$$ |
| 6 | Less biodiversity, number of scarce species than habitat type 5 | ↑ $$$$ |
| 7 | Less biodiversity, number of scarce species than habitat type 6 | ↑ $$$ |
| 8 | Less biodiversity, number of scarce species than habitat type 7 | ↑ $$ |
| 9 | Less biodiversity, number of scarce species than habitat type 8 | ↑ $ |
| 10 | Least biodiversity; least number of scarce species | ↑ $ Lowest |

genetic variability of individual populations, and available viable corridors to surrounding habitats.

To differentiate critical habitats, natural breaks in the total number of species (biodiversity) and the number of scarce species will be used. Thus, an extensive analysis of local, regional, and global species conditions will be implemented. Information from National Heritage Programs will be used and modified due to biases naturally incorporated with the index. The index is biased towards already surveyed sites (false negatives), mappable points that can physically move themselves, emphasized rarity, and small conserved natural areas (opposed to larger areas). All of these bias examples will be resolved. The analysis extensions of the index will deter these biases so that habitat types will be as fairly and accurately distributed as possible. GAP Analysis will also be used in defining critical habitats, although non-conserved areas will be accentuated under the assumption that natural areas are already protected against destructive human interference. If information is needed very quickly (i.e. 6 months or less), Rapid Ecological Assessments will be implemented. A common unit will be developed for all data collection to reduce confusion of habitat value and quality, and all data will be hybridized into one analysis.

The price of the permits will be determined by multiplying the habitat type by a number that has not yet been resolved. This number will ensure a dollar amount when multiplied out that is high enough to deter developers and resource extractors, but low enough to still allow for some development or resource extraction.

The prominent goal of this plan is to discourage development, resource extraction, and human interference with the most essential habitats of the wildlife and fish sector of the commons. High priced permits are meant to deter corporations from buying land. It is realized that these habitats possess more function than just wildlife and fish habitat, therefore increasing the natural value of the land. Since most land in Vermont and other areas of the world has most of its high levels of biodiversity, core habitat areas, and major fish and wildlife corridors away from urban areas, these lands will be harder to develop on since the permits to develop will be so much more expensive than the land closer to already developed areas. This will help retract development and other human interferences from rural areas to urban areas.

Once a piece of land is protected by something such as a conservation easement or state park, any land adjacent to it automatically has an increased value since it is an important buffer to the core zone of the conserved land. This plan is to act as an additional or assisting mechanism to already established legal systems, such as conservation easements and town, state and national parks.

If habitat or land crucially needs a higher level of state protection, the Fish and Wildlife Department, or the Vermont Agency of Natural Resources can auction off a limited amount of development/natural resource extraction permits, with the lower numbered habitat type permits being the most limited (also the most expensive, as explained above) and the higher numbered habitat type permits being the most abundant. The number of permits needs to be reduced each auctioning period.

Auctioning would mean that restrictions would have to be put on various landowners, and that they would not be able to sell their land to whomever they wanted, whenever they wanted. The Biodiversity and Land Conservation Fund would take away certain privileges that many landowners have, but it would return vast amounts of land back into the commons since fewer individuals would have control over what activities will happen on the land. Many private landowners would obviously be opposed to this, so it needs to be done slowly while the reasoning is clearly explained. For the loss of certain privileges, landowners should be partially compensated for the amount of profit that they would have otherwise received.

The economic purpose of these permits is to create revenue from rent, rather than tax. Unlike a tax, rent does not cause inefficiency in the market. For example, a tax creates deadweight loss, which is inefficient because profit is lost by both the consumer and the producer. The rent collected in the case of this conservation fund generates profit from the unearned income of developers, leaving them with a higher proportion of earned income to unearned income. The money generated from this conservation plan should be entirely used by the Vermont Agency of Natural Resources. For the large proportion that the Fish and Wildlife Department receives, at least half should be put into the Fish and Wildlife Trust Fund since this will soon generate more than what is invested into it.

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# Assessing Revenue and Regulation of Vermont Forests

*By Mark Kolonoski*

## Introduction

Forests cover more than 4.6 million acres of the Vermont landscape. This makes Vermont the fourth most forested state in the country by percentage (Vermont Division of Forestry). These forests provide a number of assets to communities such as wildlife habitat, recreation opportunities, aesthetic use, water services, soil stabilization, and air quality control. Along with these natural benefits there are economic benefits provided by forests. A 2007 report released by the North East Foresters Association revealed that the annual contribution of forest-based manufacturing and forest-related recreation/tourism to the Vermont economy is over $1.5 billion. Vermont's communities depend on healthy forests to maintain their quality of life. It is vital that these forests be managed appropriately to secure a healthy environment and a healthy economy.

The economic benefit provided by Vermont's forests is made clear when examining the financial effects of forests. The following facts were provided by the North East Foresters Association for 2005: forest-based manufacturing contributed 9.3 percent of Vermont's total manufacturing sales. Forest-based manufacturing provided employment for 6,379 people and generated payrolls of $207.4 million. Forests-based recreation/tourism provided employment for over 6,300 people and generated a payroll of $93 million. Revenues from forests-related recreation/tourism totaled $485 million. Landowners received estimated stumpage revenue of $31.5 million. Christmas trees, wreaths and maple syrup sales generated approximately $22 million (The Economic Importance of Wood Flows from Vermont's Forests). When these revenues are applied to a dollar per acre scale, forest based manufacturing generates $224 per acre, recreation and tourism generates $109 per acre, and Christmas trees/maple products generates $2 per acre.

## Forestry Revenue

The forest-based manufacturing system consists of many different sectors. There are both large and small-scale operations all throughout the state. There are logging operations, pulpwood operations, wood energy operations, and furniture operations. Also, a variety of manufactures such as hardwood and softwood sawmills, veneer mills, and biomass energy plants exist throughout the state. These sectors are being challenged by global competition, high energy costs, worker recruitment and retention, and other factors. Yet Vermont's forest industry, through innovation, continues to thrive. Exploring new products and developing new markets is vital to the industry's survival.

In 2005, the forestry and logging sector employed approximately 800 individuals and had a payroll of over $32 million (US Dept. of Labor). The majority of these 800 individuals were loggers and truckers employed by small logging companies. Logging contractors range from single-person operations using chainsaws and skidders to large-scale operations that use the latest in logging technology. The logs harvested by these foresters are either processed at sawmills in Vermont or exported for further processing. "In 2005, 118.6 million board feet of hardwood saw logs and 92.8 million board feet of softwood saw logs were harvested from the forests of Vermont. In that same year, 48,468 cords of hardwood pulpwood and 72,358 cords of softwood pulpwood were harvested in the state. Over 189,607 green tons of whole tree chips were harvested in 2005 as well. The estimated value of these harvested volumes to landowners in stumpage equals $33 million" (The Economic Importance of Wood Flows from Vermont's Forests).

The paper and pulp sector is important to Vermont forest-based manufacturing. 1997 census data reveals 1,735 people were employed by this sector with a payroll of $59 million. The data also reveals the total value added for paper manufacturing was $172 million and the value of shipments was $382.1 million. The 2005 data

shows approximately 1,400 were employed with a payroll of $50 million and adding $138.8 million to the gross state product. There are several paper mills existing in the state, but no pulp mills are present. As a result pulpwood is shipped to mills in New York, Maine and Canada. Two small pulp mills in New Hampshire, both closed in 2005 and 2006, used approximately 1.2 million tons of pulpwood per year when in operation, a great portion of which came from Vermont.

Wood energy provides roughly 6 percent of the electrical and heating needs in Vermont (North East Foresters Association). The biomass (wood burned for energy) comes from treetops and low quality harvested trees. Biomass is often a byproduct of forestry harvests, land clearing, development, and sawmills. This new market provides and outlet for previously disregarded wood. Low quality wood, unsuitable for lumber or paper, now has a market demand. In 2005, revenues from biomass totaled $5 million (The Economic Importance of Wood Flows from Vermont Forest's). The Vermont Department of Forests, Parks and Recreation estimates approximately 275,000 cords of wood were harvested in 2005 for firewood; resulting in roughly $1.4 million landowner profit.

Furniture is a substantial sector in forest-based manufacturing. "In 2005, 2,433 individuals were employed in this sector, with a payroll of $75.9 million. The total value added for furniture and related products was $153.3 million and the value of shipments was $273 million" (The Economic Importance of Wood Flows from Vermont's Forests). Furniture and related products are part of the secondary manufacturing category. Secondary manufacturing refers to the process in which lumber is turned into a finished product. These products include cabinets, countertops, furniture, canoe and kayak paddles, and custom architectural woodwork. The diversity of trees growing in Vermont contributes to the variety of secondary manufacturing opportunities. There are five hundred companies throughout the state whose focus is on the secondary manufacturing process. These companies, often rooted in rural communities, provide much needed jobs and economic stability.

**Vermont Forest Resource Harvest**
*Number of units harvested in 2005*

| Category (units) | 2005 |
|---|---|
| **Total Harvested (cds)** | **804,872** |
| North | 461,687 |
| South | 343,186 |
| **Saw logs (Mbf)** | **211,428** |
| Hardwoods | 118,589 |
| Softwoods | 92,840 |
| **Log Exports (Mbf)** | **72,892** |
| Hardwoods | 39,623 |
| Softwoods | 33,269 |
| **Log Imports (Mbf)** | **44,647** |
| Hardwoods | 35,769 |
| Softwoods | 8,878 |
| **Pulpwood (cds)** | **120,826** |
| Hardwoods | 48,468 |
| Softwoods | 72,358 |
| **Whole Tree Chips (gt)** | **189,607** |
| Pulp | 0 |
| Fuel | 189,607 |
| **Mill Consumption (Mbf)** | **183,342** |
| Hardwoods | 114,733 |
| Softwoods | 68,609 |
| **Mill Residues (gt)** | **208,879** |
| Pulp | 119,885 |
| Fuel | 88,994 |

*Mbf: Thousand board feet*
*cds: cords*
*gt: green tons*

The table at left comes from the 2005 Vermont Forest Resource Harvest Summary. It tells the exact number of units harvested for the identified uses.

## Tourism and Recreation

The 2007 North East Forester Association report on the economic importance of wood flows from Vermont's forests, states that forest resource recreation activities and tourism contribute $485 million to the Vermont economy. The activities included in this report are camping, hunting, hiking, downhill skiing, cross-county skiing, snowmobiling, foliage viewing, and wildlife viewing. There are other activities such as fishing, kayaking, rock climbing, snowboarding, and others not included in the report. Due to this absence of activities the actual contribution of recreation to the Vermont economy may be higher. These results were gathered from the latest (2004) National Survey on Recreation and the Environment. The Consumer Price Index was used to update the expenditure data per participant-day. Direct estimates of expenditures were also taken from the 2004 National Survey of Fishing, Hunting and Wildlife-Related Activities. Revenues from these activities are widely dispersed throughout the local economy. Spending is distributed among purchase of food and beverages, gasoline service stations, accommodations, restaurants, retail stores, and other services. A total of nearly 6,300 individuals are employed in this sector, with a payroll of $93 million.

## Conservation

In order to preserve and protect its forest resources, Vermont has adopted a number of programs to assist landowners with the financial burden of owning

undeveloped land. These programs offer tax incentives and direct financial rewards for the preservation of open spaces. In 1978 Vermont developed its Current Use Program. The program was enacted to: "assist the maintenance of Vermont's productive agricultural and forest land; to encourage and assist in their conservation and preservation for future productive use and for the protection of natural ecological ecosystems; to prevent the accelerated conversion of these lands to more intensive use by the pressure of property taxation at values incompatible with the productive capacity of the lands; to achieve more equitable taxation for undeveloped lands; to encourage and assist in the preservation and enhancement of Vermont's scenic natural resources; and to enable the citizens of Vermont to plan its orderly growth in the face of increasing development pressures in the interest of public health, safety, and welfare" (Vermont Statues Annotated, Chapter 124, Section 3751).

In order to be eligible for the Current use Program, land must fall into at least one of the following three categories:

- **Agricultural land:** at least 25 contiguous acres in active agricultural use; or smaller parcels which generate at least $2,000 annually from the sale of farm crops; or actively used agricultural land owned by or leased to a farmer. The landowner will be taxed at use value and will have a perpetual obligation to pay a land use change tax of 10% or 20% of the fair market value of developed portion.

- **Forest land:** at least 25 continuous acres of forestland managed according to state standards and an approved forest management plan. The landowner will be taxed at use value and will have a perpetual obligation to pay a land use change tax of 10% or 20% of the fair market value of developed portion.

- **Conservation land:** any land, exclusive of any house site which is certified under subsection 6306(b) of Title 10, which is owned by an organization that was certified by the commissioner of taxes as a qualified organization defined in 10 V.S.A. subsection 6301a. For at least five years preceding its certification was determined by the internal revenue service to qualify as a Section 501(c)(3) organization which is not a private foundation as defined in Section 509(a) of the Internal Revenue Code, and is under active conservation management in accord with standards established by the commissioner of forests, parks and recreation. The landowner will be taxed at use value and will have a perpetual obligation to pay a land use change tax of 10% or 20% of fair market value of developed portion.

According to the Vermont Department of Taxes, with whom the program is administered, in 2000, there were 11,303 parcels enrolled in the Current Use Program and 8,899 landowners. This totaled 1,628,404 acres and covered 27.4% of the state land area. Landowners enrolled in this program reduce their maintenance cost and increase the profitability of the land. Land is more likely to be passed to and maintained by future generations if property taxed does not hinder the beneficiary.

There are numerous federal incentive programs available in Vermont, which rewards landowners for conservation practices. The Forest Land Enhancement Program (FLEP) is a program funded by U.S. taxpayers. "The objective of the Forest Land Enhancement Program is to encourage long-term stewardship and management enhancement of non-industrial private forest lands for economic, environmental, and social benefits by sharing the cost of developing and carrying out an approved Landowner Forest Stewardship Plan" (FLEP Handbook). In 2005, the Vermont Department of Forests, Parks and Recreation received $121,348 from the federal government to be allocated to eligible landowners. In 2006, it received $39,784 (www.fedspending.org). The practices of a Forest Stewardship Plan include reforestation and regeneration, forest stand improvement, water quality improvement, watershed protection, fish and wildlife habitat improvement, forest health and protection, invasive species control, fire and catastrophic event rehabilitation, and specific special practices. The landowner must agree to maintain these practices for ten years after the plan has been completed.

Another federal program available in Vermont is the Wildlife Habitat Incentives Program (WHIP). WHIP began in 1998 and was expanded by the 2002 Farm Bill, which greatly improved available tools for improving wildlife habitats. Participants in the program agree to a partnership with the Natural Resource Conservation Service (NRCS). "NRCS works with the participant to develop a wildlife habitat development plan. This plan becomes the basis of the cost-share agreement between the NRCS and the participant. NRCS provides cost-share payments to the landowners under these agreements and are usually 5 to 10 years in duration, depending on the practices to be installed" (NRCS Fact Sheet). While WHIP targets many habitats besides forests, it includes conservation practices that benefit them specifically. These practices include early succession management, mast tree release, invasive plant management, and fencing to protect sensitive areas. Other federal programs offer similar financial incentives for preserving forest resources. They include the Forest Legacy Program, Environmental Quality Incentive Program and the Conservation Reserve Program.

## Regulation

The vast majority of Vermont forests are privately owned. The United States Department of Agriculture reports in the 2005 Forest Inventory and Analysis that 80% of Vermont forests are family owned. This report also states that 11% is federally owned, 7% is state owned, 1% is locally owned, and 1% is business owned. Because so much land is privately owned there are fewer forestry regulations as compared to other states. The rules and regulations which do exist can be divided into four broad categories. These include forest fire control laws, forest harvesting laws, forest pest quarantines, and use of state lands by commercial enterprises. These laws are regulated by the Vermont Division of Forestry.

Because so much forestland is privately owned, it is difficult to regulate small-scale cutting operations. These are operations where cutting is taking place on less than 40 acres. If a landowner intends to cut on a larger scale they must submit an Intent to Cut Notification for Heavy Cutting. Heavy cutting is defined as "a harvest leaving a residual stocking level of acceptable growing stock below the C-line, as defined by the United States Department of Agriculture silviculture stocking guides for the acceptable timber type" (www.vtfpr.org). Other regulations pertaining to forest harvesting are based on the Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont. "The AMP's are intended and designed to prevent any mud, petroleum products and woody debris (logging slash) from entering the waters of the state. They are scientifically proven methods for loggers and landowners to follow for maintaining water quality and minimizing erosion" (www.vtfpr.org). The Agency of Natural Resources Enforcement Division conducts any necessary actions for violations of these regulations.

Forests are protected and harvests regulated not only because of the economic stimulus they provide but also the services they provide to every person in surrounding communities. These services are defined as ecosystem services. They include services such as water quality and quantity control, soil stabilization, air quality control, carbon sequestration, biological diversity protection, recreation opportunity, hunting and fishing, aesthetic and passive use, pollination, wildlife habitat, and cultural heritage. The current estimated value of all the worlds' ecosystem services is $33 trillion (Costanza et. al.). Placing a value on Vermont ecosystem services is still an area which requires further exploration.

## State Revenue

Vermont forests generate revenue for the state as well as for individuals. State agencies earn these revenues through activities such as logging and fee and permit acquisition. There are three major state agencies that benefit from state forests. They include the Department of Natural Resources; the Fish and Wildlife Department; and the Department of Forests, Parks and Recreation. The revenue generated by these agencies supports state activities; there is no money going to individuals or private corporations.

## State Parks

The money generated through state park activities, other than logging, is estimated to reach $6.58 million for fiscal year 2008. All revenue generated by state parks is placed into the "Parks Special Fund". This fund covers all park costs such as payroll, maintenance, repairs, new infrastructure, and a variety of awareness campaigns. Park entrance fees generated $3.579 million in 2007 and are estimated to generate $3.98 million in 2008. These numbers also include merchandise sales. Special use permits and home rentals totaled $61,517 in 2007 and are estimated to reach $78,000 in 2008. Activities requiring special use permits include agricultural uses, music festivals, weddings/parties, and any activity that disrupts park use for others. Vermont has seven ski resorts operating in state parks. These resorts lease mountaintops and forests and generate an average of $2.5 million a year for state parks. In 2004, ski resorts brought $2.44 million to the Parks Department. There are a number of communication facilities located on state park owned mountaintops. These facilities are leased by television, radio, and telephone companies and generate an average of $25,000 per year (Craig Whipple, Director of State Parks).

The 2008 Parks Department budget totals $7.5 million. This includes a $1,605,183 payroll for 35 year-round employees (without benefits), and a $2,207,376 payroll for 80 seasonal employees (without benefits). The difference between generated revenue and annual budget for 2008 is $920,000. In order to cover this difference the Parks Department receives assistance from the state General Fund. The sources of the general fund include individual income tax, sales tax, transfer tax, meals and room tax, as well as many smaller tax sources. Money from the general fund is then allocated on a need-based basis.

## Fish and Wildlife

The Vermont Department of Fish and Wildlife is another agency that receives revenue generated by Vermont forests. This money is not allocated anywhere outside of the department. Due to federal regulation, all funds generated by logging on fish and wildlife property must be redistributed within the department. This is because the acquisition of new lands is often funded by the Federal Fish and Wildlife Division. The Vermont Department of Fish and Wildlife acts as a

non-profit organization in relation to their logging practices. Harvesting is not determined by profit maximization, but initiated instead for the greater good of an ecosystem. Once the harvesting approach has been determined for a given year, logging privileges are then auctioned off to local logging companies. The winning bidder is then made to set up a bond for 20-25 percent of the accepted offer. This bond acts as an insurance policy forcing the company to follow fish and wildlife regulations. If it is determined regulations were not followed the bond is awarded to the department and not returned to the company. Funds earned through auctioning and possible bond gains are used in a number of ways by the Fish and Wildlife Department. Funds often support management programs for the protection of a variety of species. They support education programs and community outreach. The money assists in the acquisition of new lands and in acquiring land use rights.

The department's fiscal year begins on July 1 and ends June 30. In 2003, 347 acres were harvested earning $71,153. In 2004, 663 acres were harvested earning $99,680. In 2005, 445 acres were harvested earning $188,606. In 2006, 530 acres were harvested earning $188,236. In 2007, 443 acres were harvested earning $180,486 (Paul Hamelin, DF&WL Habitat Biologist).

## State Forests

All timber sale and permit fees revenue earned from Vermont State Forest land is placed into the Land and Facilities Trust Fund. The fund was established by the Agency of Natural Resources in 2001. "The Agency's intent is to build the fund to a sufficient level that it is able to contribute substantially towards stewardship efforts for the lands, facilities, and recreational assets it manages" (Land and Facilities Trust Fund Annual Report, 2008). This fund has financed projects such as the repairing of Osmore Pond Picnic Shelter in 2007, which totaled $77,219. The following balances were found in the Land and Facilities Trust Fund Annual Reports from 2005 to 2008:

- **At the end of FY'04 fund balance totaled $1,084,163.**
  - Timber Sales . . . . . $986,238
  - Permit Fees . . . . . $33,383
  - Donations. . . . . $620
  - Interest . . . . . $63,922

- **At the end of FY'05 fund balance totaled $2,069,892.**
  - Timber Sales . . . . . $1,904,945
  - Permit Fees . . . . . $50,769
  - Donations. . . . . $3,169
  - Interest . . . . . $111,009

- **At the end of FY'06 fund balance totaled $2,726,263.**
  - Timber Sales . . . . . $2,510,805
  - Permit Fees . . . . . $66,200
  - Donations. . . . . $6,050
  - Interest . . . . . $143,208

- **At the end of FY'07 fund balance totaled $3,198,959.**
  - Timber Sales . . . . . $462,760
  - Permit Fees . . . . . $20,295
  - Donations. . . . . $55
  - Interest . . . . . $70,072

## Taxes

The state of Vermont uses forests to generate tax revenue. The Current Use Program, as mentioned above, lessens the tax burden for owning undeveloped land. Joining in this program is a lifelong commitment. Therefore, a penalty is given anytime a landowner opts out of the program. This penalty is called a Change Tax. The penalty is based on 10-20 percent of the market value of the land. For the 2007 tax year, landowners saved $39,531,330 in tax dollars. This is a substantial saving and landowners must somehow makeup for this loss to the state if they decide to exit the program. Melissa Bailey, a UVM researcher, found that in 2001 $616,736 was generated by the Current Use Change Tax, $690,922 in 2002, $487,607 in 2003, and $404,155 in 2004. This revenue includes all land eligible for the Current Use Program and in addition to forestlands, also includes agriculture land and preservation land.

## Value of Forestry to Vermont

The Vermont economy depends on forestry to remain strong. While the dependence is not what it once was, forest-based manufacturing and recreation/tourism still supply $1.5 billion to the economy. This financial base is founded on healthy and sustainable forest practices. Forests provide opportunities for wood product manufacturing, paper and pulp manufacturing, furniture and related product manufacturing, and forestry and logging. These sectors, along with recreation and tourism, employ roughly 12,679 individuals and have a combined payroll of $300.4 million. Wood is being used as biomass for energy production. There are currently two biomass plants in Vermont assisting in the search to find and utilize renewable resources. Vermont recognizes the need to protect its forest resources. The state has adopted a Current Use Program to offset the bias towards the development of land. Vermont landowners may enroll in a number of federal programs which promote forest stewardship and conservation as a way to protect the forests for future generations. Vermont is a state with deeply rooted private ownership values. The majority of the state's forests are under private ownership, but 4.6 million acres remain forested, proving Vermont residents have

an appreciation for the forest and resist development. The Vermont government attempts to regulate large-scale harvesting operations and enforces a number of forestry requirements. Vermont recognizes the importance of forests, not only to the economy, but also the community. The challenge for foresters and wood manufactures will be the competition from cheaper products and materials. As long as healthy harvesting practices are applied and landowners understand the benefits of undeveloped land, Vermont will continue to feel the benefits forests provide.

## Summary of New Revenue Potential

Current public revenue of $27 million from forests in Vermont consists of State Forests: $3.2 million, State Parks: $6.58 million, Fish and Wildlife: $180,486 (logging), and the current use program: $17 million. Private revenue of $774 million comes from Forest-based manufacturing: $207.4 million, Recreation/tourism: $485 million, Forestry and logging: $32 million, Paper and Pulp: $50 million. If we consider that logging removes a fund of trees providing ecosystem services such as CO2 absorption, climate regulation, reduction of erosion, habitat, etc. then we could consider a "Depletion of Ecosystem Services (DES) tax on forestry and logging. A tax of 10% on $32 million would generate roughly $3.2 million of revenue, that could be used to restore forests, and also feed a trust fund for the public. Another possibility is to revise the current use penalty when properties are removed from current use and sold for development. This penalty does not seem to adequately recover the revenue lost during the period of current use for forests. A better formula than the present one would recover all the lost revenue from the sale, by finding the original purchase price of the property, adjusting it for inflation, then subtracting it from the selling price. We could also impose an auction and insurance bond regulation, and create a Vermont forest land bank. Regarding changes in management, the DES tax could be managed by the Vermont Agency of Natural Resources, the state could appoint private woodland foresters, and the current use program could use additional employees.

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# Message in a Bottle: Bottling Economic Rent for Public Revenue

*by Colin McClung and Gary Flomenhaft*

In order to calculate potential revenue from ground water extraction by bottling companies in Vermont it is first necessary to determine what companies are actively engaged in bottling. There seems to be some confusion on this issue regarding what companies are "active" and which are not. A recent article in *Seven Days*[1] quotes Scott Stuart – a hydrologist with the water supply division of the Agency of Natural Resources – that nine bottled water companies have licenses to operate in Vermont by registering for a "collection" permit. Dennis Neland at Vermont Water Supply said he could only recall six – what he called – "active" companies in Vermont. These are: Clear Source, Vermont Natural Water, Vermont Heritage, Walden Springs, Colton Spring, and Merrill Spring. When queried on this discrepancy, he clarified that the numbers did match because all the companies that were registered were all that were active. However, this claim omits Vermont Pure, Ltd., which proudly displays its 2008 net returns under this name on the internet even though it is a subsidiary of Clear Source.

## Revenues: Vermont Pure, Ltd.[2]

Total sales for the first quarter of fiscal year 2008 increased 7% from $15.3 million in 2007 to $16.4 million. Gross profit also increased 7% in the first quarter of 2008: from $8.6 million in 2007 to $9.1 million. Gross margin for the quarter, as a percentage of sales, of 56% was unchanged from year to year. Net income increased 76% to $512,000 in the first quarter of fiscal year 2008 compared to $291,000 in the first quarter of fiscal year 2007.

The waters are muddied furthermore by the fact that the parent company Clear Source was "… formerly owned by Vermont Pure Springs"[3]. While Clear Source is on the list of registered companies, its former owner and other companies such as Pristine Mountain Springs in Stockbridge, VT, are not listed. Further investigation[4] is needed into these discrepancies to clear up if this is just an issue where companies are under subsidiaries of a larger company on this list or if "active"-only-when-registered status is just a convenient, unenforceable loophole for these companies.

Groundwater mapping in Vermont has been approved. The statistics gleaned from such an undertaking may offer a wealth of information presently unavailable, as the state of Vermont does not currently keep records on groundwater collection**. When Vermont Water Supply (VWS) was contacted looking for statistics on groundwater revenues for the state of Vermont the response was, "too general…anything [serving] beyond twenty-five people is considered [a] public water system and each is unique." According to an anonymous staff member at VWS, the following are the disparate parts that make up groundwater revenue in the state: wells, part sellers for wells, bottled water, contract operators, chemicals (that go in to the processing), permitting process (fees) for well and septic set up for residential use, consultants, water use, state administration fees charged, and public water system fees.

The following data can give us an indication of how much of the state's groundwater resources are being collected for privatization and profit by bottling companies.

### Groundwater Stats[5]: Withdrawals

Approximately 50 million gallons of groundwater are withdrawn daily in Vermont. Withdrawals from public and private groundwater sources account for 33 million gallons per day. Agricultural withdrawal accounts for 2 million gallons daily, another 12 million is used for commercial and industrial purposes, and the remaining groundwater withdrawals are used for mining and the generation of thermoelectric power.[17]

### Drinking Water

Groundwater is currently used for drinking water by approximately 70% of Vermont's population. About 46% of the population is self-supplied while about 24% are served by public water systems using groundwater (USGS, 1997). In 2003, there were 22 new or modified groundwater sources that required a source permit from WSD. Of the 2,078 active farms within Vermont, 85-

90% rely on groundwater for agriculture use[5].

**Wells**

It is estimated that 320,000 Vermonters get their drinking water from about 93,500 private wells. This number does not include dug wells or springs. Approximately 2,000 new private wells were drilled and reported to the WSD in 2003. It is estimated that 80% of the private wells are completed in bedrock and 20% in gravel aquifers. The mean well depth is about 200 feet and the mean yield is about 6 gallons per minute (WSD, 2003). Groundwater levels in Vermont are measured at 12 monitoring wells located throughout the state. For the year 2003, groundwater levels were normal from 1/03 to 6/03 and above normal from 7/03 to 12/03[17].

**Scarcity**

Six public water supplies have had insufficient water quantity in recent years to meet their water demands. Water shortages have occurred at Jericho Heights (Jericho), Oglewood (Milton), Magic Village (Londonderry), Deep Rock Water FD#8 (Barre Town), Eaton's Mobile Home Park (Royalton), and Windy Hill Acres located in Springfield[18].

**Mapping**

87% of the public community water systems in the State have their corresponding Source Protection Areas or aquifer recharge areas mapped. The remaining public community water systems are using 3,000 foot radius circles as their Source Protection Areas (WSD, 2003).

Existing aquifer maps include the Groundwater Favorability Maps (1966 to 1968), which cover the entire state, the Geology for Environmental Planning series (1975) that covers 66% of Vermont and was primarily based on data from the Superficial Geologic Map of Vermont (1970) and the Centennial Geologic Map of Vermont (1961).

In the 1980s, ANR provided aquifer maps to 20 towns for planning purposes while just 2 years ago VGS produced an aquifer map in Arlington. These maps included a depth to groundwater map, a thickness of overburden map, and an aquifer yield maps. *(Report on the Status of Groundwater and Aquifer Mapping in the State of Vermont, 2003)*.

## When in Rome?...

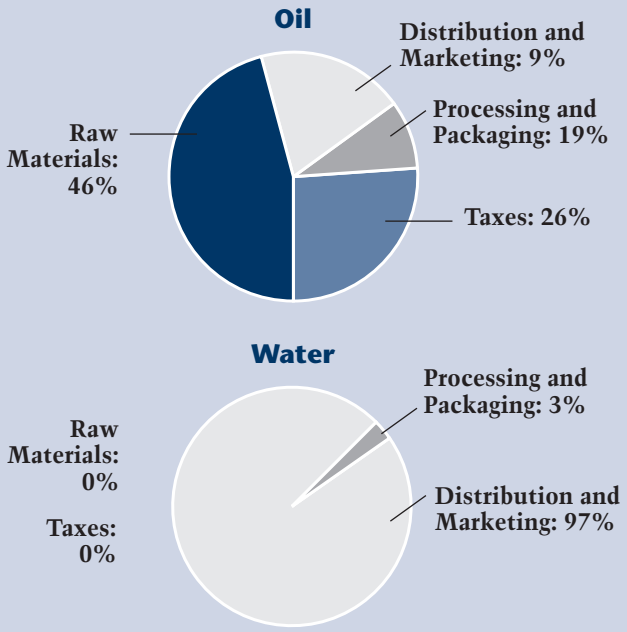
There are three angles from which it may be possible to attack this issue to possibly regain control and ultimately begin to collect economic rent: **legal, economic** and **public health**. A recent article in *Nature*[6] magazine provides the idea for a fourth angle: **energy**. By 2030 global energy consumption is expected to grow by 50%. New England's projected growth in this period is 15%[7]. If Vermont decides to meet this need with nuclear power — a source that may be making a comeback — the projected increases upon scarce water resources will be exacerbated. For example, Vermont Yankee nuclear Power Plant "provides Vermont with nearly three fourths (73%) of its electrical generating capacity[8] *prior* to the 2006 up-rate and meets 35% of the peak electrical requirements of the state[9]. The nuclear plant uses the adjacent Connecticut River for condenser cooling water." It uses a boiling water reactor[10] which "David Lochbaum, a nuclear engineer with the Union of Concerned Scientists in Washington, said [Vermont Yankee] takes approximately *19 million gallons of water a day out of the Connecticut River during the summer*, and less in the winter.[11]" If nuclear energy is expanded, an increase in energy needs will also require increased withdrawal from the Connecticut River and, at some point, surrounding sources, especially if the Connecticut River's ecosystem begins to falter due to the increased thermal discharge[12]. It seems that groundwater resources could become a logical option and will become increasingly vulnerable to this extraction process with a rise in energy – especially nuclear – consumption. All of this would be precipitated furthermore by a rising population and the lack of an alternative energy infrastructure in place.

An integrated, alternative approach may seem daunting – even unrealistic – to some, yet its origin and practical applications have existed for millennia. "By 40 B.C., Roman water-management practices had matured to include concepts for water-infrastructure protection and security, watershed management, and providing treatments for water resources of different quality or reserving aqueducts for separate purposes.[13]" Such accumulated knowledge should not be lost. The US may not be Rome, yet we are beginning to show signs of disintegration similar to what weakened their empire. We need not follow the example set by Rome toward our own decline but instead should take the wisdom of that age and apply it in hopes of not suffering a similar fate. Much of the engineering and law of the Roman Empire has endured to today in western culture, so at least in terms of water and law, when in Rome…why not do what the Romans would have done?

On March 31, 2008 a representative [Laura] at the Agency of Natural Resources, Department of Environmental Conservation was asked how many companies were operating in Vermont. With regard to companies selling bottled water in Vermont, Laura mentioned that one hundred and nine companies did business in Vermont, including international companies as far away as Spain and Greenland and as close as Canada. All of these companies, by ANR standards, must be transporting their water quite a distance — half way across the Atlantic in some cases — to sell in Vermont. This doesn't seem like that efficient a model. Maybe they haven't picked up stakes and off-

shored their operation, but it would seem logical that these companies have looked into outsourcing their operation to Vermont. Now, if you were a CEO selling water to Vermonters and shipping it across the border or the Atlantic and are looking to maximize profit and cut costs, where would be the best location? Such an operation would need a host of agreeable conditions: an accommodating state legislature and abiding agencies, a bounty of unmapped "collectible" water sources and very little to no oversight in place. Only one state in New England can claim such perfect conditions — Vermont.

**Costs of Business:**
**Oil Industry versus Water Industry**




*Source: H2O for Maine, Education and Information, page 9*

*Laura provided a monthly water usage data sheet for three companies:*

- ***Pristine Springs of Vermont*** *(4,813,425/yr) gallons used from 12/31/07 – 2/29/08*
- ***Vermont Natural Water*** *(727,500) 5/01/07 – 2/01/08 (x 12/9 = 970,000/yr)*
- ***Clear Source Springs-Bottling*** *(112,668,065) 3/01/04 – 2/01/08 (28,233,905 Aggregate total for 2007 = 2,352,825 gallons per month average)*

***Total usage per year*** *= 4,813,425+970,000 + 28,233,905 = 34,017,330 gallons/year*

## Calculating Economic Rent on Clear Source, Vermont Natural Water, and Pristine Springs

These three bottling companies alone extract 34,017,330 gallons of water per year of water from Vermont. The table below shows that the gross profit on one acre-foot of water is $1,300,875. 34 million gallons of water is equal to 104.3 acre-feet. At a gross profit of $1,300,875 per acre-foot that equals a gross profit of $135.7 million. Note the "Bottle Water Calculator" table is for a "six pack" of 24oz water bottles selling for $3. Bottled water is often sold in single 32-48 oz bottles for much more. The cost of water to bottlers is essentially zero. All the costs are in bottling, marketing, and distribution. This table shows a gross profit of 75 cents on an 85 cent bottle or 88%. Since the cost of bottling may not include marketing or overhead costs the net profit may be lower. So given the limited information available lets grant the bottlers an additional 18% margin. That leaves 70% of the revenue as economic rent for the people of Vermont. Eighty-five cents for 24 oz is equal to $4.53 per gallon of bottled water (1 gallon = 128oz). At $4.53/gallon, 34,017,330 gallons of bottled water equals $154.2 million of total revenue. 70% economic rent equals $107,948,327 revenue for the people of Vermont. While this may sound high, consider that Norway charges a total of 88% on each barrel of oil extracted and as a result has a national pension fund of $301 billion, currently being used to soften the blow of the recession.

**24-Ounce Bottle Water Calculator**

| | |
|---|---|
| Cost of one acre-foot of water[2] *(An acre-foot of water is 43,560 cubic feet or roughly 326,000 gallons)* | $1,630.00 |
| Cost of Bottling | $0.10 |
| Selling Price of 1 Bottle | $0.85 |
| **Gross Profit For One Acre Foot Sold** | **$1,300,875.50** |

*Source: http://waterdividendtrust.com/information/waterprofit.php*
*http://waterdividendtrust.com/documents/education.pdf*

## Ecological Caps & Preservation Allocation

At some point withdrawal fees will need to be increased to offset the risk to surrounding ecosystems and will ultimately have to have an ecological cap. Withdrawal should be capped when it begins to negatively impact various aspects of the ecosystem as evaluated and determined by various independent scientific research teams funded by fees on bottle water companies. Such a cap would be placed upon the companies' withdrawal and/or collection limits previous to new permit registration or re-issue. Companies such as Clear Source and others would be fully educated and aware beforehand of their growth potential in a specific region and adjust the cost of doing business in Vermont accordingly.

Not only could bottle water companies afford the above mentioned rent payment, but they still would be receiving (at least in this example from Maine) 18% net profit. Applied to the above 2007 bottling company water consumption numbers, three Vermont bottlers made $135.7 million of profit in 2007.

If the state took 70% in economic rent, between 2 to 3% should also be spent on preservation of the resource. This percentage would go back not only to the state where the profit was gained but also to the exact region within the state most impacted by the collection. An example Vermont could use (when it begins to gather its own bottle water company numbers) is: Under such provisions (ecological cap and preservation fees) the state of Vermont and bottle water entrepreneurs could calculate the actual growth potential of business in Vermont without becoming too financially dependent upon bottle water companies for jobs while allowing the state some fiduciary leverage and options with the funds provided. It could be a watershed moment, allowing a state which has just recently decided to cut 400 state jobs[16] the chance to keep the green — in its many forms — in The Green Mountain state.

[1] March 12-19, 2008, pg. 14A "Groundwater Moratorium Unearths Legal Uncertainties," Mike Ives

[2] http://biz.yahoo.com/prnews/080317/nem067.html?.v=40

[3] *Seven Days*, Feb. 27 – March 05, 2008 Pg. 26A "Groundwater Rising", Mike Ives

** "Collection" and "Artesian" are terms wielded by bottle water companies. When profiled for the above footnoted report, these companies insisted they are not bottling groundwater, but instead collecting naturally overflowing water from beneath the surface. Since not "pumped" or "withdrawn" they are "not subject to rules and regulations governing groundwater."

[4] http://64.233.169.104/search?q=cache:sObwLUbF__0J:www.mass.gov/Eeohhs2/docs/dph/environmental/foodsafety/permlist_draft.rtf+Vermont+Bottle+water+permit+holders&hl=en&ct=clnk&cd=1&gl=us&client=firefox-a

[5] http://www.anr.state.vt.us/dec//waterq/planning/docs/305b/pl_305b04-part7.pdf

[6] Nature: March 2008, Vol.452/20, "The Energy Challenge"

[7] Ibid

[8] Wikipedia "Vermont Yankee" with footnoted source as http://www.eia.doe.gov/cneaf/nuclear/page/at_a_glance/states/statesvt.html

[9] Wikipedia "Vermont Yankee" with footnoted source as http://www.eia.doe.gov/cneaf/nuclear/page/at_a_glance/reactors/vermontyankee.html

[10] http://www.eia.doe.gov/cneaf/nuclear/page/nuc_reactors/bwr.html

[11] http://www.nuclear.com/n-plants/Vermont_Yankee/Vermont_Yankee_news.html

[12] http://vlsvy.wordpress.com/ "Vermont Yankee Trail: The Current State of Affairs" July 27, 2007

[13] *Nature:* March 2008, Vol.452/20, "The Energy Challenge": Frontinus, S.J. *De AquisUrbis Romae;* and Vitruvius, M., *De Architectura, Book VIII*

[14] "Vermont is the only state in the country that VNRC is aware of that does not have state groundwater maps." VNRC Memorandum, Groundwater Study Committee: Overview of GW Issue in VT, 12/07/07, Jon Groveman pg 2

[15] 1.5 million (50,000 gallons a day X 30) is the maximum one can withdraw without a permit - No.144 of the Acts of the 2005 Adj. Sess. (2006). Hence such companies need a permit yet could conceivably divide their subsidiaries (Vermont Pure* and a spring in Stockbridge, VT, conveniently the home of Pristine Mountain Springs*) so that each could collect near capacity amounts yet remain — by ANR standards — as "not active".
*http://64.233.169.104/search?q=cache:sObwLUbF__0J:www.mass.gov/Eeohhs2/docs/dph/environmental/foodsafety/permlist_draft.rtf+Vermont+Bottle+water+permit+holders&hl=en&ct=clnk&cd=1&gl=us&client=firefox-a

[16] *Seven Days:* "Thin and Bear It", Ken Picard, April 02-09, 2008 pp. 24-25A

[17] http://pubs.usgs.gov/ha/ha730/ch_m/index.html

[18] http://www.anr.state.vt.us/dec/watersup/wsd.htm

# The Ownership of the Internet and the World Wide Web in Vermont

*By Ida Kubiszewski*

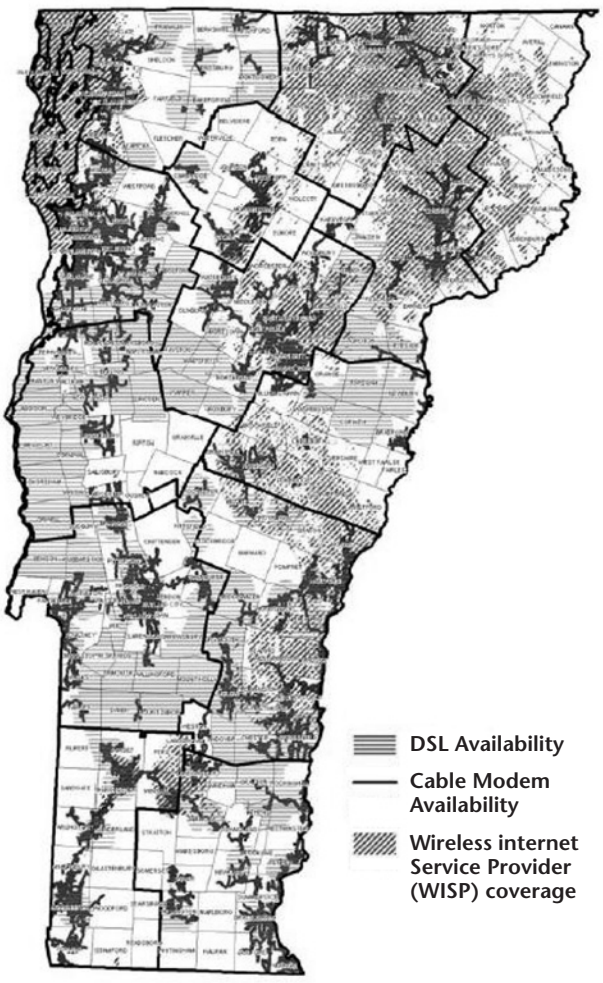
## Introduction

In the past two decades the Internet and the World Wide Web (the Web) have evolved from a small network used primarily by a few universities and the military to a primary means of communication. They have interwoven themselves into practically every aspect of our lives and have become resources which everyone expects to be available, especially in the United States. In Vermont, however, there are still large geographical areas which don't have high-speed access.

To reduce confusion, we define both the Internet and the Web. The Internet is a "network of networks," creating a global infrastructure allowing for computers to communicate amongst each other. Information can travel over the Internet in certain formats or languages known as standard Internet Protocol (IP). There are a variety of languages that can be used including SMTP (used for e-mail), Usenet (used for news groups), instant messaging, FTP (used for file transfers), and HTTP (used by the World Wide Web). The World Wide Web is a means of accessing and communicating information over the Internet in a language called the Hypertext Transfer Protocol (HTTP). It's a means of publishing and interlinking pages containing hyperlinks.

Various groups have been responsible for the development of both the Internet and the Web, including the government, military, individuals, non-profits, and large private corporations, and universities. The development of the Internet hardware infrastructure has required large financial investments by all these groups. These investments include manufacturing, purchasing, installing, and maintaining servers, personal computers, and interconnecting cables.

The Web, on the other hand, was initially developed at CERN, where in 1993 it released the software into the public domain, stating: "CERN relinquishes all intellectual property rights to this code, both source and binary form and permission is granted for anyone to use, duplicate, modify, and redistribute it."[1] After that release it was developed into what we use today by the community at large.




## Current Status of Access to the Internet

At the national level, internet users are comprised of 24% Digital Subscriber Line (DSL). subscribers, 24% cable modem service, 50% dial-up access, and 1% satellite internet services.[2] As of December 31, 2005, the Federal Communications Commission (FCC) estimated that there were 88,317 residential high-speed subscriptions and 95,901 high-speed lines in Vermont.

### Internet Infrastructure

The internet is made up of a network of computers and cables, creating a worldwide grid. Within the United States, different scales of internet

conduits exist. The backbone of the internet is a nation wide connection carrying large volumes of internet traffic over long distances. These major conduits are usually owned by wholesale internet companies. Internet service providers pay wholesalers for accessing this backbone and connecting their customers to the internet. Depending on the density of the region, ISPs have to pay anywhere between $10 per Mbps per month (Boston) to $100 per Mbps per month (Vermont).

Slightly smaller conduits come off the backbone and deliver internet to local networks, this type of connection is known as the 'middle mile.' Depending on the density of the region and size of local companies, the 'middle mile' may be owned by either a wholesaler or one of the ISPs. The final span connects the 'middle mile' to individual homes and is called the 'last mile.' The majority of these are installed and owned by ISP companies, government, or individuals.

Much of Vermont is mountainous and not very densely populated. This increases the cost of providing Internet to rural communities due to the necessity of installing poles and putting in the 'last mile' of cable. The current price for installation of the 'last mile' of cable in Vermont is around $20,000 per mile[3]. If the density of homes ranges from 14 to 25 per mile with an area, ISPs are prohibited from charging customers additional fees for the cable line extensions. However, if the density is below this critical density and demand still exists, customers may be charged for the extension. The Public Service Board (PSB) monitors the cost per mile that an ISP charges customers who are responsible for paying for the extension of cable lines.

Creating broadband infrastructure can also be done through telephone lines by providing DSL. Installing DSL requires central telephone serving offices and midrange service areas to be upgraded; this upgrade entails most of the cost since about 95% of Vermonters already subscribe to telephone service. The National Exchange Carrier Association (NECA) recently estimated that such an upgrade costs between approximately $988 and 1,033 per line[4].

A fiber-optics infrastructure has the greatest initial capital investment requirement, but it also provides the best long-term affordability. There are three main expenses with providing broadband through fiber optics: fiber distribution network, main hub or central office, and connection from the road to a residence or business. Burlington Telecom estimates an average cost of $3,000 per subscriber in urban areas and $4,000 in rural areas.

In Vermont, as a means of encouraging broadband deployment, pole owners are regulated to charge rates proportional to the amount of space being used on

**Estimated Residential Broadband Availability in Vermont**
*As a Percentage of Population—2006**

| County | Cable Modem Availability | DSL Availability | WISP Availability** | Total Broadband Service Availability |
|---|---|---|---|---|
| Addison | 50% | 83% | 0% | 90% |
| Bennington | 78% | 60% | 10% | 86% |
| Caledonia | 59% | 50% | 57% | 85% |
| Chittenden | 89% | 82% | 29% | 97% |
| Essex | 21% | 20% | 28% | 41% |
| Franklin | 58% | 60% | 41% | 78% |
| Grand Isle | 0% | 63% | 92% | 97% |
| Lamoille | 54% | 25% | 32% | 68% |
| Orange | 33% | 33% | 14% | 62% |
| Orleans | 52% | 44% | 69% | 86% |
| Rutland | 76% | 86% | 0% | 95% |
| Washington | 73% | 76% | 11% | 94% |
| Windham | 64% | 67% | 3% | 78% |
| Windsor | 66% | 75% | 31% | 89% |
| **Statewide** | **68%** | **69%** | **24%** | **87%** |

* *Availability is based on map and other information reported to the state by service providers. Cable information is based on availability as of the end of year 2005. DSL and WISP information is based on information reported at various times by companies between August and mid-December 2006. In some counties, cable modem, WISP, or overall broadband availability shown is lower than that reported in prior PSD reports. This does not reflect an overall reduction in actual broadband availability in any county, but instead revised reports on the extent of existing broadband availability by WISPs or cable companies, or the correction of errors in prior reports.*

** *Not all WISPs operating in Vermont have submitted service availability information suitable for inclusion in these estimates by the time of publication. Zero percent availability of WISP services shown for Rutland and Addison Counties does not reflect the availability of services from WISPs believed to be operating in these counties.*

*Source: Understanding Broadband Deployment in Vermont*

the pole. The city of Burlington owns 33% of the poles and partially owns the rest (55% ownership) with Verizon owning the remaining percentage.[5] This requires Burlington Telecom to negotiate with Verizon if additional cables are required on poles. However, due to the 1996 Telecommunication Act, Verizon is required to lease any lines they have already installed to competitors at wholesale rates. Even with this act in place, small competitors are still unable to afford such an investment in rural areas but it may make competition somewhat more viable in urban areas. Such a barrier to entry limits the competition and eliminates the potential for an open and free market within the ISP industry.

### Regulations

The Federal Communications Commission (FCC) has designated internet services as interstate information services, limiting Vermont's authority. The Federal Cable Act also prohibits Vermont from requiring specific infrastructure investments by the Internet Service Providers.[6] To encourage the ISPs to extend their availability, in 2006 the public service board of Vermont allowed Verizon leeway in determining the type of technology to be used and the areas it will provide converge; in exchange, Verizon agreed to provide 80% availability by 2010.[7]

To encourage the development of independent companies, Vermont companies are part of the National Exchange Carrier Association (NECA) which helps independent companies pool their costs and revenues, making transition between carriers simpler. The NECA is mostly for phone companies, but broadband internet often is provided by telephone companies.

## Public ISP Revenue, Expenses, and Net Profit

Many towns around the country are establishing their own telecommunication services. Most often these are privately financed but for public use. A fiber optic network was put in place by the Vermont Telephone Company in Springfield, VT. Burlington has also begun providing its residents with internet, phone, and television cable services. These networks are free for use by any other company wishing to provide competing services. "This is similar to a City providing public roads while also providing basic bus service as well. Citizens and businesses can use the bus service or they can use the roads to provide their own transportation."[8] Communities like Montpelier and Rutland are negotiating joining the Burlington network as a means to reduce their own initial costs.

### Revenue

Burlington has approximately 18,000 homes and 2,500 businesses. As of August 2007, approximately 1,800 Burlington subscribers signed up for Burlington Telecom, with businesses making up 14% of potential customers. Taking the average revenue of $77 from residents and $243 from business per month, and using the percentage of potential subscribers, we find that Burlington Telecom makes approximately $61,236 from businesses and $119,196 from residents each month, for a total of $2,165,184 annually. The rate of growth at the time was approximately 40 new subscribers per week.

### Expenses

The Burlington Telecom project was split up into four distinct sections. The first phase deployed a 16.5 fiber optic system at a price of $2.6 million, where $1 million was used on start up and operation costs, while $1.6 million was used on equipment. This phase primarily connected government offices. Phase two added a few large businesses to the network. The total cost of phase two was only $750,000 due to the fact that the selected businesses were near the existing network. Phases three and four expand the network to smaller businesses and residences. Burlington took out a fifteen-year loan for approximately $28 million to cover the costs.

Besides the initial $31 million in capital, Burlington pays approximately $2 million in debt servicing and $2 million in operating costs each year.

### Net Profit

By extrapolating from its current revenue and knowing its future expenses, Burlington estimates that the net income from the telecommunication services can eventually provide, once the debt is paid off, more than 20% of the city's general fund. This equals approximately $15 million/year.[9]

Springfield, Vermont, the only other town to have a public fiber-optic telecommunication network installed, had a population of approximately 9,000 in the year 2000. Using the populations we can estimate that Springfield will have a net income of about $3.5 million per year.

## Private ISP Revenue, Expenses, and Net Profit

### Revenue

Knowing the population sizes of the United States and Vermont and the amount of internet users in the U.S. in 2005, we were able to determine that there are approximately 425 thousand internet users in Vermont in that year. Using data from the U.S. Census Bureau, we know the total revenue of Internet Service Providers (ISP) in the United States in 2006 was $18.5 billion, and using the percentage difference between U.S. and Vermont populations, we were able to determine that the revenue made by ISPs from Vermont users was approximately $39 million.

This revenue includes internet access service, online

| | United States | Vermont |
|---|---|---|
| **Population** | 299,093,237 | *623,908*[10] |
| **Internet users** | 203,824,428[11] | *425,177* |
| **Revenue** | $18,576,000,000[12] | *$38,749,505* |

*(Numbers in italics were calculated)*

advertising space, internet backbone service, internet telephony, website hosing services, information technology design and development services, and other operating revenue.

### Expenses

There are two major initial expenses when an ISP is introducing internet to a region. First is the initial investment into the infrastructure to provide the availability to each home and business. ISPs, in certain circumstances, have to put in the "middle mile" to provide access to a region and then place the "last mile" of cables. Installation of the "last mile" may also require buying or renting pole space or putting up new poles. The other cost is hooking up the "middle mile" to the backbone conduits since ISPs must buy access to the backbone from the wholesalers. Depending on density of a region and competition amongst ISPs, infrastructure costs are occasionally passed on to customers. An influx of ISPs in recent years decreased the price of high-capacity Internet access delivered to locations in Vermont from $300 per Mbps per month to about $100.

Long terms expenses are primarily made up of maintenance of cables and customer services, but others may include personnel costs, materials and supplies, purchased software, electricity and fuels, lease and rental payments, repair and maintenance, advertising and promotional services, and governmental taxes and license fees. In 2006, United States Internet Service Providers had a total of almost $16 billion in expenses. This translates to almost $32 million in expenses in Vermont.

This financial structure will change significantly as private companies begin utilizing the freely accessible publicly installed fiber cable infrastructure.

### Net Profit

Using the total revenue and expenses of the United States Internet Service Providers, we can determine the net income ISPs make off Vermonters to be approximately $6 million per year.

Economic rent exists due to the high primary barrier of entry for an ISP company into the market. These barriers are the high initial infrastructure costs or rental costs of cables already owned by other private ISP companies.

The economic rent will increase significantly as private companies begin to freely utilize the fiber-optic network put into place by the government. This will reduce all of the initial infrastructure costs or rental costs usually associated with introducing service into an area.

## Domain name registration and other related services

### Process

A domain name registrar is a company accredited by the Internet Corporation for Assigned Names and Numbers (ICANN) to register Internet domain names.[13] ICANN is a non-profit corporation which oversees various internet related industries on behalf of the U.S. government, specifically the Internet Assigned Numbers Authority (IANA). Currently, approximately 1,000[14] accredited domain-name registrars exist. However, ICANN contracts out the management of the .net and .com domains to VeriSign, a company out of California.

Under the Shared Registration System (SRS), a user chooses which registrar they use for their domain name, and may switch any time. The domain names which are under the management of ICANN and that a registrar register are: .aero, .biz, .cat, .com, .coop, .edu, .gov, .info, .jobs, .mobi, .mil, .museum, .name, .net, .org, .pro, and .travel.[15]

### Revenue

Due to lack of available data, a total number of Vermont registered domain names in 2007, was not reported. However, the number of .com domains in Vermont in July of 2001[16] and the number of registered domain (.biz, .info, .org, .net, .com) names in the world in 2001 and 2007[17] was attainable.

**Number of registered domain names**

| | | Total | Com | Coms % of total |
|---|---|---|---|---|
| **In World:** | 7/14/2001 | 30,089,731 | 22,845,079 | 75.9% |
| | 10/15/2007 | 96,946,506 | 73,433,353 | 75.7% |
| **In USA:** | 7/2001 | *25,030,006* | 19,003,575 | |
| | 10/2007 | *80,644,510* | *61,085,201* | |
| **In Vermont:** | 7/2001 | *46,527* | *35,325* | |
| | 10/2007 | *149,907* | *113,549* | |
| **Growth Rate** | | *222%* | *221%* | |

*(Numbers in italics were calculated)*

This allowed us to determine the number of total domain names registered in Vermont in 2007 to be approximately 150,000.

Other related internet services include business process and data management, web site hosting, collocation, IT design and development, IT technical support, IT technical consulting, software publishing, information and document transformation services. The revenue for registration of domain names and these other services is approximately $70 billion in the United States. Taking the proportion of domain names registered in Vermont, we can determine that the sale of domain names and other related services generates $130 million per year from Vermont customers.

**Expenses**

Each ICANN-accredited registrar pays a fixed fee of US$4,000 plus a per-registrar variable fee totaling US$3.8 million divided among all registrars. For every .com registered for a user by a registrar, the registrar has to pay an annual fee of US$6.00 to VeriSign and US$0.25 administration fee to ICANN. Other expenses outside of fees that the registrars have include daily operation costs such as personnel costs, hardware and supplies, purchased services, and others.

Other related services have less governmental taxes and fees. Other expenses include personnel costs, equipment and materials, software purchases, electricity and fuels, rental payment, repair and maintenance, advertising and promotional services, and other operating expenses. Within the entire United States industry, these expenses equal $60 billion per year. Using the proportion of registered domain names in the U.S. versus Vermont, we find that the expenses from Vermont are $112 million per year.

**Net Profit**

Looking at the difference between the total revenue and expenses that these companies have, we can determine that approximately $18.5 million per year is made off domain names registered in Vermont.

**Rent**

The contents of the Web and the Internet have evolved out of the collective knowledge of our entire society and have become a commons of information. There are, however, various corporations which make a substantial profit off connecting people to the Internet and providing services related to the Web. These companies are making a profit by utilizing a resource they do not own, a resource that was developed by a collective whole and not through the resources of single entity.

A portion of those profits should be given back to the public due to the fact that portions of the Internet and the entire Web were created by everyone and belong to everyone. Rent also presents itself through the lack of free market within the ISPs. The barriers to entry are too high for any individual to start their own ISP, mostly due to the expense and regulations surrounding the "last mile."

Some may also argue that the ISPs are crucial to the development the Web and the Internet and hence provide significant positive externalities. These externalities include improved communication, telecommuting which saves energy, social networks, etc. However, this does not detract from the fact that corporations are making a profit off someone else's intellectual resources and community and should be in part returned to those that developed it.

To calculate rent, we looked at the profits of the Fortune 1000 companies in the United States in 2007 and found an average of 7% net income. If we consider this 7% percent real profit and the remaining economic rent, we are able to determine the amount of profit that can be distributed to the public, in theory, without affecting price.

In the case of public telecommunication, where income is made by the cities of Burlington and Springfield, Vermont, and is placed into a general city fund, from there to be used as the city deems necessary. We suggest that only 7% of the profit be placed in the general fund, as earned income by the city, while the rest be placed into an established trust. The total income derived from both towns equals approximately $18.5 million. This would allocate $1.5 million back to the cities (Burlington getting $1.2 million and Springfield getting about $300 K), and $17 million into this trust.

When calculating the real profit and economic rent within private ISPs, we can use the cross industry standard for real profit as well. Currently, private ISPs make approximately $6 million off Vermont users. This is approximately 15% of their total $38.7 million revenue from this area. If they were to keep the standard 7% and the rest be placed into a trust, they would be adding approximately $3.3 million per year.

Doing a similar calculation for corporations which sell domain names and provide other related internet services, we find that their revenue from within Vermont is approximately $130 million while their net income is $18.4 million, a 14% profit. If we leave 7% as real profit, we find that the economic rent owed to the Vermonters would be $9.3 million per year.

Totaling up all the economic rent, we find that economic rent owed to Vermonters is approximately $30 million per year. Instead of dividing this money into equal dividend of about $50 per person, which promotes consumption and encourages the investment into private goods, the money would be placed into a trust with the primary purpose of supporting and furthering research and intellectual development in an open forum.

The spending of the trust money would be decided by

the trustees. Some potential uses of trust money would include the support of research done on a collaborative basis and in which all knowledge will be released to the public, buying out expired patents and opening them to the public, or supporting and encouraging initiatives promoting collaboration on patents and copyrights. The most significant criteria of support will be that all information and research must be placed openly on the Web.

## Conclusion

Portions of the Internet and the entire World Wide Web were developed by individuals working to improve society's intellectual richness, creating an intellectual commons. With the exception of certain aspects of the Internet, the two have become resources owned by everyone. Various corporations have found ways to make a profit off this commonly owned resource, a resource they did not create. Although these corporations are needed for the continual development, portions of their profits should be in some way returned either directly or indirectly to the people.

With the establishment of a trust which encourages further intellectual development within the public domain, the money would be returned to the public and used for the public good. It would support continual development of the Web and Internet, improving those commons.

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# Use Value and Management Structure of Broadcast Spectrum in the United States

*by William Murray*

Radio spectrum is quite possibly one of the most highly regulated naturally occurring resources of all time. From cell phones to remote controls, from TV sets to garage-door openers, virtually every wireless device depends on access to the wireless spectrum. Despite spectrum's immeasurable importance in the current information age, insiders have "little incentive to disclose their information to the public, for the less the public knows about spectrum, the greater the insiders ability to profit."[1] One report was quite accurate when it stated, "spectrum policy is too complicated for you to understand."[2] Spectrum as we know it spans from 3kHz to 300GHz with an electronically audible range of 20kHz and above. Since the regulation of radio frequencies in the early 20th century, the spectrum has been subject to chronic limitations.

Pioneering regulators assumed that conflicting transmitters in any spectrum would lead to interference, which inadvertently led to the creation of artificial scarcity through regulation, now referred to as "the doctrine of spectrum scarcity."[3] With virtually every usable radio frequency already licensed to commercial operators and government entities, the world is experiencing a type of spectrum drought. Since the beginning of spectrum regulation, every new commercial service, from satellite broadcasting to wireless local-area networks, has created competition for licensing with numerous existing users, including the government—all of which guard their spectrum jealously. Since 1994, allocation has been left up to an auctioning system that awards the newly available spectrum to the highest bidder; only 2% of the spectrum has been distributed this way. Before this restructuring, 98% of spectrum was merely given away to private entities for the exchange of "in-kind" public service rather than cash. Broadcasters aren't required to pay for their spectrum use, rather they claim to provide $8 billion a year in unverified public service.[4] All of this apparent privatization, even though the FCC denies any private ownership, ignores The Communications Act of 1934, which states that broadcast spectrum belongs to the public.[5]

A common misconception that supports the current system of regulation is that the spectrum is a scarce and finite resource. Radio waves are freely transferred over the radio spectrum despite regulation. Therefore, when licensing spectrum rights, the Federal Communication Commission and National Telecommunication and Information Administration is actually controlling the right to deploy transmitters and receivers that operate in particular ways, not a piece of a finite resource. Consequently, the extent to which there appears to be a spectrum shortage largely depends not on how many frequencies are available, but on the technologies that can be deployed.[6] Regulations that are intended to create harmony on the airwaves instead create artificial limits on spectrum utilization, which creates massive inefficiency as many frequencies remain unused.

In the past, televisions and radios relied on tube receivers that required a frequency buffer to avoid intermixing channels. Today's digital receivers are capable of utilizing "smart" technologies to pick out only the channels they need.[7] Signal interference could soon be a thing of the past, which should make exclusive licenses unnecessary. This presents the possibility for an open access commons with virtually no capacity limits and unlimited public access. Of course, this possibility is very unsettling for broadcasters, phone, and cable companies if implemented through flexible public licensing.

In the United States, the regulatory responsibility for the spectrum is shared by the FCC and the NTIA. The FCC is responsible for managing the spectrum designated for non-federal use i.e. state, local government, commercial, private internal business, and personal use. The NTIA is a branch of the Department of Commerce responsible for spectrum designated for Federal use, for example, the Army, FAA, and FBI. Interestingly, 64% of the spectrum below 3.1GHz (most valuable), and 95% of the spectrum below 300GHz is designated for undisclosed Government use.[8] Congress mandates that the FCC impose and collect fees

designated for application processing fees, "to prescribe charges for certain types of application processing or authorization services it provides to communications entities over which it has jurisdiction."[9] All application processing fees are deposited in the US treasury as mandated by the Omnibus Reconciliation Act of 1989. The FCC also collects regulatory fees to recover the annual cost of enforcement, policy and rule making, user information, and international activities. Regulatory fees became standard after the Omnibus Reconciliation Act of 1993 in Section 9 of the Communications Act.[10] The regulatory fees do not apply to government entities, amateur radio operator licensees, and non-profit entities (College, Religious, Public). In FY07 there were 10,806 registered for-profit licenses totaling $21,168,225 in regulatory fees paid to the FCC. Fifty-four for-profit licensees paid a total of $55,272 to the FCC in Vermont (excluding mobile, and fixed communication).[11] Fees paid from any radio station are not specifically designated to contribute to federal spending on the state from which they came. Therefore, it is difficult, if not impossible, to narrow down the direct influence that the state of Vermont gains from FCC regulation fees. What is more interesting is how insignificant this number is compared to the tremendous use value of the broadcast spectrum. According to a report released by the New America Foundation on December 31, 2001, the current use value of the entire broadcast spectrum was $301.78 Billion.

This number excludes a recent auction of the "700MHz" spectrum by FCC to cellular companies AT&T, Verizon, and Google, to name a few, who bid up the value of the latest chunk of spectrum to US$ 19 Billion dollars.[12] While this number is truly stunning, it is important to note that the actual value of the spectrum is driven by physical properties of the radio spectrum that are much broader than the specific transient valuations created by one or two independent auctions; therefore, these auction values can be misleading in their enormity.[13] As stated in the report, the total use value is the value of spectrum to marginal firms only. Most firms holding spectrum earn more than a marginal return on their holding, and on average are able to earn twice what the marginal firm does on spectrum, setting the producer surplus at half of the previously stated marginal value ($301.78 x ½ = $150.89). Through this calculation we come up with the number $452.67 Billion.

The study continues its analysis by considering the additional value to companies if they could have spectrum to use as they see fit outside of the current misallocations. To accomplish this goal they applied a technique known as a "Delphi Study." This strategy anonymously polled a small panel of leading independent experts in economics and technology use and asked them to answer questions regarding how much money companies would be willing to pay for different pieces of the spectrum above and below 3.5GHz, and how they would use them. They then took this information, re-circulated the answers to the same panel for adjustment, and came up with an industry consensus on how much they were worth. After averaging the numbers they found that an additional value of $257 Billion for spectrum below 3.5 GHz and $61 Billion for spectrum above 3.5 GHz for a total of $318 Billion of potential value from spectrum flexibility (less regulation). Finally, they polled how much additional

**Current Use Values**

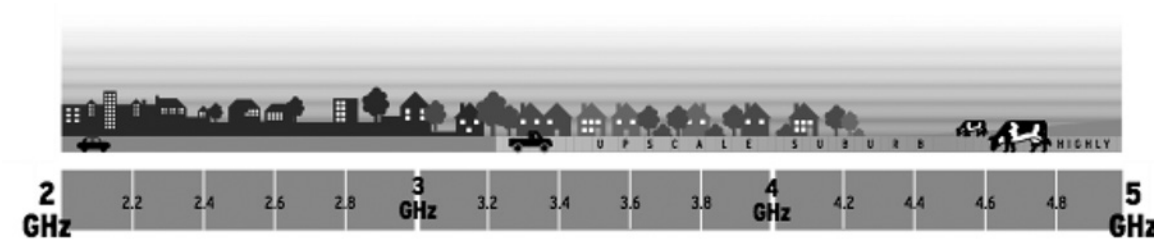
| Application | Frequencies* | Total MHz** | Value MHz-pop | Total Value *($billions)* |
|---|---|---|---|---|
| *Mobile Communications* | | | | |
| Cellular | 824-891.5 MHz | 50 | $4.18 | $59.50 |
| Broadband PC5 | 1850-1975 MHz | 120 | $4.18 | $142.80 |
| Other | 806-940 MHz | 15 | $4.18 | $17.85 |
| *Broadcasting* | | | | |
| VHF & UHF TV | 54-806 MHz | 402 | $0.233 | $26.19 |
| Radio | 0-108 MHz | 21 | $8.19 | $48.16 |
| Satellite TV | 12.2-17.5 GHz | 900 | $0.021 | $5.34 |
| Satellite Radio | 2320-2345 MHz | 25 | $0.040 | $0.28 |
| *Fixed Communications* | | | | |
| LMDS | 27.5-31.3 GHz | 1300 | $0.0024 | $0.87 |
| 39 GHz | 38.6-40 GHz | 1400 | $0.0015 | $0.59 |
| News Gathering | 1990-2025 MHz | 35 | $0.0204 | $0.20 |
| | | | **Grand Total. . . . . .** | **$301.78** |

* *This indicates the range of frequencies in which this service is located. The entire spectrum range is not necessarily used for the indicated purpose.*

** *This column shows the total amount of spectrum used for the indicated purpose.*

spectrum it would require to amount to half the total benefit for the spectrum above and below 3.5 GHz and came up with 160 MHz and 300 MHz, respectively. After adding all of these separate segments to the current use value, the total potential value to license holders for completely flexible licenses is $771 Billion.[14] The three largest contributors to this statistics are broadcast TV, mobile phones, and satellite communications. Broadcast TV is equal to $495 Billion, mobile phones $203 Billion, and satellite communications $50 Billion. To show how much additional value can be generated from flexible licensing, consider the 6 MHz allocated for television broadcast channel 14. If this frequency were put to its best use (most likely cellular telephone) it would create additional revenue of $7.2 Billion; an increase of nearly $6.8 Billion.[15] Under current regulation, this windfall of profit would find its way directly into the pocket of the license holders.

Spectrum value is a great indicator of why spectrum licenses are so jealously guarded by their holders. As the graphic below indicates, spectrum value differs much in the same way as real estate.




The higher the radio frequency, the less valuable it gets – so much so that 1% of the spectrum below 3.5 GHz is worth more than 99% of the spectrum above 3.5GHz.[16] The lowest spectrum frequencies are the most penetrating, least power intensive and longest traveling signals, making them tremendously valuable.[17] This topic is always mentioned when discussing the possibility of implementing flexible use licensing in the lower spectrums. License holders always argue that there is plenty of spectrum currently using flexible licensing plans, but they fail to mention that these are among the least effective and least valuable frequencies.

Given all of this information, it's clear that the broadcast spectrum is a goldmine of public revenue that has yet to be mined to its full potential. As Senator John McCain once stated, "They used to rob trains in the Old West. Now we rob spectrum."[18] The tremendous amount of value in broadcast spectrum lends itself to considerable private interest lobbying that has profound effects over decisions made by the FCC. If positive steps are to be made in the future, disenfranchised decisions must remain in the forefront. The future of spectrum technology is unknown, and without the benefits of free market spectrum allocation the FCC faces risky decisions on the deployment of valuable broadcast spectrum. Among all else, it is clear that the current mismanagement of socialized radio spectrum allocation provides one of the most promising opportunities for commons reform in the future.

## Economic Rent in Spectrum

Senator Larry Pressler, Former Chair of the Senate Commerce Committee once stated, "The history of U.S. spectrum policy is replete with horror stories of government stifling technological development and new wireless services to the public."[19] The contemporary experience with public-interest spectrum regulation emphasizes that these decisions characteristically squander rich possibilities for efficient airwave utilization. Proper management of the broadcast spectrum has tremendous potential to serve as a source of public revenue if spectrum is treated as common property. The government manages the "public airwaves" on behalf of the public by allocating spectrum for different uses.. After the government decides what types of services are allowed in a given band of frequencies, it may license use of that band to specific entities such as broadcast companies, mobile telephone companies, police departments, and hospitals. While centralized allocation of this nature seems efficient, it ignores the public interest and serves only the privately owned license holders who profit handsomely off of their exclusive spectrum rights.

The current mechanism used to coordinate spectrum use is equipment regulation, which generally uses power limits to prevent interference. This management structure is considered a form of command and control, which limits allowable uses based on regulatory judgement.[20] While this system seems sufficient assuming efficient spectrum allocation, this is not the case. By centralizing control in this manner, society must wait for the state to set resource-access rules band by band; the state inhibits the market's ability to efficiently allocate the resource based on general use guidelines that would otherwise be managed by a commons in the public's interest. In the past, these allocations have been mere giveaways to private companies, amounting to billions of dollars of lost revenue for the FCC. An exclusive use model will be most efficient in many cases; however, government may also consider promoting the important innovation benefits of a spectrum commons by allocating spectrums bands for shared use, similar to land allocated for public parks. Even with commons spectrum allocation, it is

essential to maintain some aspect of private property rights to reasonably evaluate trade-offs under a regime of exclusive ownership rights.[21] This is essential because a market without the evaluative measure of opportunity cost conceals the actual cost of the resource, thus eliminating the necessary inputs for efficient decision making.[22]

In both cases, common access and limited use-spectrum rules exist to exclude certain activities and facilitate others. Therefore, the essential difference lies in the method of control; that is, which parties get to formulate the rules governing spectrum access? Current government policy aims to minimize signal interference yet these potential interferences are a byproduct of productive airwave use. Efficient rules maximize the total value of wireless application rather than minimize the potential for signal disruption.[23] Therefore, if the spectrum allocation were to be left up to a trust rental program, we can assume that this model would prove very profitable while competitive market forces would reveal a variety of valuable allocation alternatives.[24] Under current spectrum management broadcast television, radio broadcasting, and satellite television are the spectrum owners who collect revenue by renting portions of their broadband to advertisers at the highest price the market will bear. In 2007 the collective advertising revenues for network, local, and syndicated television amounted to $46,556,745,200.[24] While this number is large and ripe for rent calculation, it cannot all be attributed to the physical use of the spectrum. So, when attempting to calculate rent it is important to apply the use-value, which assesses the amount of revenue that is derived from the exclusive ownership of the spectrum and over-the-air use of their licensing (which is often less than the advertising revenue). Also, because not every profit generating use of the spectrum relies solely on advertising revenues (satellite television, satellite radio, mobile communications) use-value provides us with a more accurate valuation of spectrum wide revenues. In order to find the current use-value of the broadcast spectrum in Vermont we can use the latest calculation by the New America Foundation in their 2001 report titled "The Citizen's Guide to the Airwaves." If we take their use value of $301.78 billion and divide by the current population of the United States (301,139,947) we get a per capita use value of $1002.12. In order to find out how much of this value lies in the state of Vermont we can multiply by the population (623,908) and get $625.23 million. Finally, with this number we can attempt to estimate the true spectrum rent value for Vermont by applying a percentage to determine what portion of these earnings are normal profit. Rent economist Mason Gaffney wrote a report in 1996 entitled Losses of Nations, which valued normal profit of a broadcast company like ABC at 45% of their revenue. Other numbers in this same report quoted similar values around 35% for broadcast companies like CBS, and the telecommunications company AT&T. For the sake of this calculation I chose 40% and came up with a normal profit of $250.1 million. Therefore, the spectrum rent value is the remaining $375.13 million. This rent money could have countless productive applications if it were kept in a spectrum trust to be used in civil applications throughout the state. After all, The Communications Act of 1934 states that the airwaves belong to the public; shouldn't a portion of the revenue from this public asset be shared?

The amount of revenue available for the state of Vermont under a trust management system provides the potential for a myriad of productive uses. Since 1994, allocation has been left up to an auctioning system that awards the newly available spectrum to the highest bidder; only 2% of the spectrum has been distributed this way. Before this restructuring, 98% of spectrum was merely given away to private entities for compensation that was hardly worth the actual value of the spectrum. Much of this was intended to promote efficient spectrum use, but to assume that forcing a particular set of unlicensed rules on spectrum users creates efficiency is to ignore the underlying actuality that the state lacks the information and the incentives to effectively evaluate the trade-offs among rival alternatives.[25] Therefore, if Vermont were to annually auction the spectrum leases there would be a more efficient and equitable distribution process that would generate another form of revenue for Vermont. More importantly, such an auction would place the incentive upon the licensees to set prices and spectrum usage through competition.

Given all of this information, spectrum policy is one of the easiest cases to make for common asset reform in the future. The current misallocations are limiting the expansion of efficient spectrum use, while privatization continues to oppose the intended public ownership of the airwaves as dictated by The Communications Act of 1934. The tremendous amount of value in broadcast spectrum lends itself to considerable private interest lobbying that has profound effects over decisions made by the FCC. Allowing public auctions of the spectrum to take place is a positive step, but as we have learned from the past it would be tragic to give them permanent and complete property rights. Admittedly, without the knowledge of the smart receiver technology that is available, current allocation may seem like an effective approach, but as the technology that utilizes the spectrum will change overtime, so should the regulatory regime.

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# Who Owns Vermont's Rocks?

*by Ian Raphael*

***"A long habit of not thinking a thing wrong gives it a superficial appearance of being right."***

*— Thomas Paine, Common Sense 1776*

In today's climate of rising costs, limited resources, and an ever-increasing disparity in America's distribution of wealth, there has been a renaissance in thinking about alternative ways of handling these issues that draws upon long standing philosophical views of man's connection with nature, cutting edge technologies, and upgraded economic models. The core principle in this collective endeavor is the idea of common ownership of earth's natural resources for not only all citizens in the current generation but also future generations. As Thomas Paine states in his work titled Agrarian Justice, "It is a position not to be controverted that the earth, in its natural, cultivated state was, and ever would have continued to be, *the common property of the human race.* In that state every man would have been born to property. He would have been a joint life proprietor with rest in the property of the soil, and in all its natural productions, vegetable and animal" (Paine, 1795). It is my belief that Vermont's wide array of stones and minerals fall into Paine's view of common property and that some sort of financial reparation should be made to the citizens of Vermont to compensate them for the excavation of this commonly shared non-renewable natural resource. The goal of this paper is to outline the

outdated governance of the mining industry and how it relates to Vermont. Second, I will discuss some of the options to increase state revenue by reclaiming a percentage of the economic rent, profit, generated by the large corporations that mine in Vermont. I will reference my previous research on the state of Vermont's mining industry, as well as draw upon working models of governance like the Alaska Permanent Fund. My hope is this paper will serve as a basis for further discussion on how Vermont can successfully manage its subsurface mineral resources in the future.

Mining rights in Vermont directly relate to the ownership of property. Landowners, if given an Act 250 permit, can extract as much material from their land as they see fit. Act 250 does not address depletion of limited resources but rather environmental impact. The revenue that the state receives from mining is mostly property taxes and understates the true value of the land. Property taxes in Vermont are based on a combination of land and building value, where the latter contributes to a higher assessment rate. Assessments also do not value any subsurface material. This means a low property value which translates to relatively low property taxes compared to the value of economic production on the land. This obvious imbalance has generated a significant amount of revenue for the mining corporations, not only in Vermont but all across the country. Governments need to rethink how they manage mining resources and change the outdated rules that may have worked in a resource rich and growth period in the past but no longer work in today's world.

To give an example of what I mean by outdated governance, "In 1872, Hawaii's King Kamehameha V died and ended a dynasty, Apache leader Cochise agreed to retire to a reservation, Susan B. Anthony was arrested for voting in the presidential election, and a dusty California outpost known as Los Angeles opened its first public library" (Los Angeles Times, 2008). The mining industry, however, is still managed at the federal level under the General Mining Act of 1872. At the time, this act was meant as an incentive to increase settlement out West by selling off public lands at five dollars an acre for the use of mining. On top of that there was no obligation to pay royalties to the government for the revenue created by these activities. That is a hard fact to swallow considering the billions and billions of dollars earned by mining corporations. To make matters even worse it is estimated that it would cost between 32-72 billion of taxpayer dollars to clean up hundreds of thousands of abandoned mines let alone deal with the environmental impact that mining has created in these areas (Earth Works). There has now been a movement to reform the General Mining Act of 1872 to establish a royalty system to not only generate revenue for the government but also to finance environmental clean up. In fact, the House of Representatives passed a bill called the Mining and Reclamation Act of 2007, HR 2262, which would set up this royalty system for mining extraction on public land (Earth Works). While the mining governance in Vermont is different due to private ownership rights, it is still feasible for Vermont to enact a similar bill and royalty system. The only obstacle at this point would be to reclaim the subsurface rights back to the citizens of Vermont. This may seem like an impossible feat but we are fortunate to have a working model of this concept in Alaska.

"Purchased from Russia in 1867, Alaska became the 49th state in 1959" (Hartzok, p.1). When setting up Alaska's constitution Article VIII of Section 2, General Authority was put into place. Article VIII reads, "The legislature shall provide for the utilization, development, and conservation of all natural resources belonging to the State, including land and waters, for the maximum benefit of its people" (Kasson, p. 1). This act gave ownership of all natural resource to the state which essentially paved the way for the establishment of the Alaska Permanent Fund. Alaska sells the right to drill oil and at a considerable higher amount than the five dollars an acre which is still the going rate in the continental United States. The first oil lease sale in 1969 yielded 900 million dollars from oil companies for the right to drill oil on 164 tracts of state-owned land. This was a huge benefit to the state if you compare it to the 112 million dollars Alaska generated in general revenue in 1968 (Hartzok, p. 2). "In 1976 voters approved a constitutional amendment, proposed by Governor Jay Hammond and modified by the legislature, which stated that at least 25% of all mineral lease rentals, royalties, royalty sale proceeds, federal mineral revenue-sharing payments, and bonuses received by the State shall be placed in a permanent fund, the principal of which shall be used only for those income-producing investments specifically designated by law as eligible for permanent fund investments" (Kasson, p. 2). The permanent fund was set up as a public trust similar to an individual trust fund where a balance between risk and investments is determined in order to maximize returns for the benefit of Alaskans. Each year Alaskans receive a portion of these funds as a dividend. The most successful aspect of this fund, however, is that it actually replaces the loss of a nonrenewable natural resource with something else. It essentially captures the economic rent from mineral extraction for the benefit of the state rather than it all going to the mining corporations. Even so, these corporations still get a considerable amount of this economic rent, which gives them the incentive to continue operations. The only difference is that the rent is distributed fairly and benefits all who have a birthright to these mineral resources. The question now is can Vermont do something similar as Alaska? It is my belief that the answer is yes. Vermont may not be as mineral resource

**Raw Mineral Production in Vermont**

*Quantity measured in metric tons. Value in Dollars.*

| Mineral | 2003 Quantity | 2003 Value | 2004 Quantity | 2004 Value | 2005 Quantity | 2005 Value |
|---|---|---|---|---|---|---|
| Sand and gravel, construction | 4,520 | 21,100,000 | 4,970 | 24,000,000 | 5,240 | 32,000,000 |
| Stone: | | | | | | |
| Crushed | 4,290 | 23,900,000 | 5,110 | 30,800,000 | 5,480 | 37,000,000 ** |
| Dimension | 102 | 26,700,000 | 100 | 30,600,000 | 981 | 27,800,000 |
| Talc, crude | W | W | W | W | W | W |
| **Total** | | **71,800,000*** | | **85,400,000*** | | **96,800,000*** |

*W= withheld to avoid disclosing proprietary data*
** = partial total due to withheld data*
***= crushed slate withheld*

rich as Alaska, but as it currently stands the state is not collecting as much as it should from the revenue created by its mineral resources.

I have thoroughly researched the mining industry in Vermont. The table below indicates that in 2005 the value of minerals extracted in the state was 96.8 million dollars. This amount excludes talc and slate extraction since this data is withheld due to it being proprietary information. When surveying the listed property values owned by the major mining corporations in Vermont, the total came to 132.2 million dollars. I applied the 1% state tax rate and the 1.79% average town tax to this value and the revenue generated from property taxes totals 3.7 million dollars. This amount comprises the majority of the state revenue from mining operations. Looking at these figures, I calculated that Vermont generated only 1.6% of revenue on the sum of property and extracted mineral value in 2005. It is also estimated in 2005 the mining industry received 63 million dollars in direct revenue. Taking this all into consideration it is clear that mining corporations are receiving the majority of the economic rent created by the excavation of Vermont's nonrenewable mineral resources.

The question to consider now is what happens when we run out of these resources? The answer is simple; Vermont loses jobs, income, and gets a large clean up bill when all that is left are abandoned mines and environmental waste. All these issues mean Vermont needs to not only start thinking in the short term but also in the long term when it comes to the depletion of its nonrenewable resources.

I propose setting up a permanent fund in Vermont where a percentage of economic rent generated from mining operations be put into trust to offset the depletion of mineral resources. This fund would first be used to support environmental sustainability projects and maintenance to Vermont infrastructure like roads, and bridges that are negatively affected by mining operations. For example, Vermont roads are constantly used by mining trucks which severely decrease their life span. As of now, taxpayer dollars are the main source of funds used for necessary repair and maintenance to these roads, which has become a major issue in the state. The second use of the permanent fund would be as a safety net when Vermont minerals are used up and the mining companies are long gone. These funds could help offset some of the financial burden due to the loss of jobs and the decreased revenue of Vermont businesses that depend on theses minerals in production. If Vermont instituted a royalty system that collected 10% of the extraction value of 96.8 million dollars in 2005 it would have generated 9.68 million dollars to be put into trust. Imagine the ripple effect this would create. When resources become more limited and the value of the minerals increases, Vermont would collect its share of the increased revenue, benefiting all Vermonters. The other alternative is that the mining corporations can keep on collecting this increased economic rent. The choice is in the hands of Vermont's governing body to decide where this money should go.

The last question to ponder is what incentive would there be for mining corporations to stay in Vermont and continue to mine if this new system was to be implemented? First, they would still be making a considerable amount of profit. Second, they know as well as anyone that the value of these non-renewable resources will continue to increase. Third, Vermont would not be the only one catching on to this new management structure. Times are changing and, as I have detailed above, new laws and royalty systems are on the horizon at the national level in addition to the programs being implemented at the state level. This

climate of change isn't just happening in the US either. Many countries are catching on to this philosophy of common asset ownership. The bottom line is that Vermont won't be pushing companies out to explore greener pastures because there won't be any. Companies will stay in Vermont as long as they can make a profit.

Like Thomas Paine said in 1776, "A long habit of not thinking a thing wrong gives it a superficial appearance of being right". Will the mining companies argue, complain, threaten, and lobby about this proposed change? Yes. Will they still stay and continue their mining operations? Yes. Vermont needs to reclaim the rights to all its natural resources including minerals. Vermonters need to stay strong in the face of adversity and do what it right. By setting up a permanent fund to offset the extraction of non-renewable mineral resources, Vermont will ensure the prosperity of its amazing heritage and provide a current and future flow of revenue for its citizens.

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# Scratching the Surface: An Analysis of Vermont's Surface Water Policy

*by Elliot Wilkinson-Ray*

It is important that we tax surface water use in Vermont. The majority of surface water taxes would be collected from hydroelectric, public supply, and thermoelectric[1] power generation.

## Why Tax?

Most importantly, we must tax surface water because it is ours. While much of our nation's history has been defined by the privatization and enclosure of natural resources, the citizens still legally control surface water. Yet, the people have failed to assert their control over this lucrative resource and legal birthright. Currently, industry enjoys free reign to use and abuse our surface waters without compensation, accumulating huge private profits. At the same time, many of our waters are polluted with toxins and invasive species. Why is the private sector enjoying windfall profits from our surface water, while the public sector is struggling to fund its clean up? This paper will outline strategies for the state to efficiently levy public funding from surface water use.

You may be wondering why it is the state's responsibility to tax surface water in place of towns or counties. The Public Trust Doctrine[2] declares the state as the trustee of Vermont's surface water. The citizens of Vermont are the beneficiaries in this public trust relationship. Therefore, the state government has a fiduciary duty to manage the state's surface water in the most responsible manner.

Therefore, a company, landowner or entity cannot own the real property rights[3] of surface water in Vermont. Bob can own the land around a pond but he does not have any special right to the actual water. Basically, we all own the water, yet no one owns it individually. Most of the United States uses the same Public Trust Doctrine.

Another important concept is economic rent. Economic rent, in its most basic form, is unearned economic profit. Usually associated with land, economic rent can also be applied to other resources where use leads to unearned profits. The interesting quality of taxing economic rent is that it doesn't negatively impact the consumer or the producer. The producer is a price taker and cannot increase the price, thus protecting the consumer. Furthermore, economic rent is the additional unearned profit above a reasonable return to investment, maintaining a profit for the producer. Another way to understand economic rent is any payment above the reservation price of the producer.[4]

A truly efficient taxation system would capture economic rent, without impacting the profitability of Vermont's surface water industries. Many economists see the capture of rent as an essential element in an equitable economic system. "Only then will we achieve real justice and start to repair the damage wrought by this age-old violation of our elementary right of equal access to our common heritage" (O'Brien, 2000:5). The challenge is how to effectively capture rent in an efficient manner.

## Hydroelectric

Hydroelectric power generation is an industry that benefits greatly from its ability to collect economic rent. Vermont hydropower currently has a capacity of 578.5 megawatts. This is close to the generating capacity of Vermont Yankee that provides 1/3 of Vermont's energy, whereas in-state hydro only provides Vermont with 9% of its power[5]. Therefore, the majority of Vermont's hydroelectric power is sold out-of-state. Total hydro sales generated roughly 165 million dollars in revenue in 2005. This value can be partially attributed to the river itself, indicating the presence of substantial rent collection. In addition, TransCanada Corporation was able to repay their investment on 8 dams, at an annual revenue rate of $150 million, in a mere 3 1/2 years. The only way these dams were able to generate such large amounts of revenue was their ability to collect rent from a public resource. Hydroelectric dams are investments with relatively large fixed costs (initial payments) and relatively small operational costs. Hence, after the infrastructure investment has been paid off, the owner enjoys large profits and small costs. The state has a responsibility to tax excess profits and give them to the

people of Vermont. Although it is difficult to estimate an appropriate rent percentage, 10% of hydroelectric revenue would total $16.5 million. There are different theories on the best way to tax hydroelectric generation.

## Entropy

Mason Gaffney says that to understand the "consumption" or "use" of water we must think in terms of entropy. Although entropy is a concept that can be used in many different contexts, economic entropy is essentially that "use" will lead to higher entropy and less efficiency. Water, for example, begins as clean water at high elevations. The more it is used, the less energy it possesses and the more dirty it gets. Certain uses therefore increase the entropy of water more than others.

When we consider water in the context of entropy we must think about it in two ways. First we have the more traditional concept of the decrease of available free energy: as water moves from mountaintops to the sea, its potential for generating energy from gravity diminishes. Secondly, we must consider the degradation in water quality as it is used. In practice, one could tax the free energy in water by creating an electric generating tax on all hydroelectric dams. This tax could be adjusted to capture only the economic rent without impacting profitability. Yet, hydroelectric producers would need to accurately report their cost structures in order to determine this tax rate. Currently, Transcanada is a private corporation selling to other private corporations, thus it is not required to publicly report its costs. Passing legislation that would force hydroelectric companies to report their revenues and costs would be an important step in effective taxation.

Another step is the taxation on ecosystem alteration and degradation that the dams are causing. Clearly each dam would need to be assessed on its impacts on surrounding ecosystems and water quality. Another way to assess this tax is to determine the opportunity cost of using that section of the river for hydro. The opportunity cost of water use would be the next best use for that water. In the case of Vermont, this would likely be value of a healthier ecosystem and the economic benefit of not having a dam in any given location.

## Small Dams

Although the large dams of Transcanada generate profit, many of Vermont's smaller dams provide electricity at the cost of production. Furthermore, many of these dams no longer pay taxes to the local or state government. The value of these dams has fully depreciated. Current operational costs are low and no water use-fee is charged because low energy prices are assumed to benefit the citizens of the surrounding area. In this instance the consumers capture the economic rent because the price is less than the market price (on the New England Grid). These small hydro facilities typically charge $.03-$.04 per kilowatt-hour whereas the US market price is usually around $.08, and the New England price averages $.12 (eia.doe.gov). The difference in these prices is pure economic rent and is captured by those who consume the most energy in these towns or regions. The state could capture this difference by charging the market value for electricity. Part of this increase in price could go towards ecosystem restoration around the dams.

Charging less than the market price is bad policy. Raising the price of local hydro would allow the state to collect the economic rent. These facilities should also pay the ecosystem alteration fee based on an opportunity cost structure. By charging the US market price, an increase of .03/kilowatt, the state could generate as much as 6 million dollars.

Due to an abundance of potential locations and increasing energy prices, hydroelectric power will become a vital source of renewable energy in Vermont. The USGS has determined potential hydro locations in Vermont with the capacity of over 400 megawatts. Today, this industry is in the hands of private corporations while the electricity is sold out of state. Reclaiming this public resource will benefit the citizens of Vermont, regulate the industry, and allow Vermonters to determine their own energy future. The combination of water usage fees for large and small hydro would be $22.5 million.

## Thermoelectric

The Vermont Yankee nuclear power plant withdraws 153.5 billion gallons of surface water annually. This is public water that is being used to generate private profit. The water is heated and degraded, thus allowing Vermont Yankee to internalize the benefits and externalize the costs. The state could charge a withdrawal fee based on the amount of water used. Even a small withdrawal fee would mean a large amount of tax revenue. For example, if charged $0.05/1,000 gallons (about 2% of the current wholesale water rate) Vermont Yankee would pay $7.6 million in annual withdrawal fees. A proportion of this tax revenue could then be allocated to research the impacts on surrounding ecosystems from the massive quantities of thermal pollution affecting the river daily. Currently, there isn't sufficient information to understand the impacts of this volume of heated water reentering the watershed. Furthermore, this rent tax could displace some of the other taxes that Vermont Yankee is currently paying on its productive activities. In fact, this $7.6 million could completely offset the $7.2 million in combined taxes Vermont Yankee paid in 2006. This would encourage the efficient use of water while lowering taxes on productive

investments.

The current tax structure for Vermont Yankee is based on short-term agreements that last for a couple years each. Many state and corporate resources are devoted to continually debating and reformatting this taxation system. A tax on water withdrawals would be a long-term agreement based on ecological impacts and the use of a public resource. If technology was implemented to decrease the impact on the ecosystem the rate could be lowered.[6]

In 2000, about 52% of fresh surface water withdrawals in the US were for thermoelectric-power use. Establishing the right to rent this use in Vermont would have serious implications for the rest of the country.

## Public Utility

With a market good, those who demand it most (demand is preference weighted by income) will purchase the good; hence it will be bought and sold efficiently. If a common-pool resource[7], such as drinking water, is sold at a market price, it will be "demanded" more by those with money. Therefore, those with the ability to pay will effectively use the common resource more than others. The inequality in ability to pay for water is a market failure. In practice, all humans equally "demand" and "require" their first units of water. Therefore, water traditionally has been a disproportionately consumed resource. Per capita, low-income families use more of their water to drink, cook, wash, and clean, whereas families in higher income brackets use more water for activities such as gardening, irrigating lawns, pools, car washing, etc. Many of these problems can be solved by a progressive tax on public water supply. A progressive tax conserves water, meanwhile switching it to higher value uses.

Another reason why taxing large amounts of water use is beneficial to society is the law of Diminishing Marginal Utility. The basic principal is that the more of a good someone uses, the less marginal utility they will derive from that use. For example, someone benefits greatly from his or her first cup of water or first slice of pizza. As the person continues to consume they become hydrated or satiated, and the marginal utility of subsequent cups or slices is diminished. After meeting basic needs, the consumer switches to less and less valuable uses. Not only would the tax on large amounts of water consumption be paid by the wealthy, it would tax water that is providing a relatively small amount of utility or benefit to the user. Vermonters would be dissuaded from using large amounts of water on their lawns and in their swimming pools, unless they were willing to pay a higher price.

## Structure

The following table is an example of this increasing price structure.

**Increasing Price Structure for Public Supply**

| 1,000 gal | Base Price | Watershed Fee | Rent | Total |
|---|---|---|---|---|
| **0-10** | 1.50 | 0.40 | 0.00 | $ 1.90 |
| **10-40** | 3.00 | 0.40 | 0.50 | $ 3.90 |
| **40-150** | 3.00 | 0.40 | 1.00 | $ 4.40 |
| **150+** | 3.00 | 0.40 | 3.00 | $ 6.40 |

The average household in Vermont uses 50,000 gallons of water a year.[8] The argument for charging less than cost for the first 10,000 gallons consumed is that the first units of water are essential. This is a subsidy to those who can use less water. The price increases as each household uses more water. The rental fee goes towards subsidizing the small water users as well as into a public trust. An estimation of the rent revenue is $639,000.

## Other Uses

After thermoelectric and public water withdrawals there remains 24 million gallons/day used for other purposes. This is about 20% of surface water withdrawals in the state. The majority of this water is used in various industries and fish aquaculture. These private withdrawals should be taxed as well. If given the same $.05/1,000 gal rate, this would generate $438,000 annually. The additional cost would encourage water intensive industries in Vermont to be more efficient with their water use. Although this tax would be designed to benefit the common good, it would not cover the environmental impacts of these uses. This tax is by no means meant to compensate Vermonters for the destruction of their ecosystems. Harmful uses of surface water should be fined at a level that makes polluting financially impossible.

## Conclusions:

**Value of Annual Rent Collection:**

Hydro . . . . . $22,500,000
Thermoelectric . . . . . $7,600,000
Public Supply . . . . . $639,000
Other Uses . . . . . $438,000
Total . . . . . $31,177,000

From these estimates, Vermont could capture $31,177,000 annually. Where this money should be allocated is debatable. Yet, there are many reasons for putting it into a common asset trust. This would be a trust fund managed for the good of all Vermonters and generated from the use of common resources. The benefit of creating a common asset trust would be the ability to manage the fund for its long-term success. State legislatures traditionally have trouble conserving funds due to their interest in public funding and their lack of financial experience. The model would be based on that of the Alaska Permanent Fund, which has accumulated $38 billion to date. Much of this success has been Alaska's ability to prevent the Legislature from spending this money. Vermont would then have the option of paying its citizens a portion of the economic rent generated from public resources. This dividend would help Vermonter's realize the value of their state's public resources. The idea being that if each citizen individually benefits from their natural resources they will actively work to conserve them.

This point addresses an integral part of reclaiming surface water in Vermont; the importance of public perception. Our rivers and streams must be seen as the valuable and public resource that they are. If you ask an Alaskan who owns the oil in Alaska, they will tell you that the people own it. If you ask a Vermonter who owns the water going through a hydro-dam, they will likely shrug their shoulders. This is likely due to the fact that Vermonters don't understand the value or the potential value of their surface water. The false assumptions are that industry's consumptive use is good for the economy and that not taxing water use will promote industry and make investment more attractive to the state. Yet, in practice this promotes inefficient use and allows windfall profits to leave the state. This is part of a greater paradigm shift in which we must reclaim the commons.

Historically, the focus of the Public Trust Doctrine in Vermont has been to guarantee and define the terms of public access to our surface water. Yet, we must distinguish between common access and common management. These two principals are inherently conflicting and their reconciliation is vital to the future of our state: "We need merely replace the common right of access with a state duty to collect revenues to serve common needs and replace other taxes." – Mason Gaffney

[1] Water for thermoelectric power is used in generating electricity with steam-driven turbine generators.

[2] Originally from English Common Law, the Public Trust Doctrine designates navigable waters to the public good.

[3] Real property or realty is the property right to land and the structures and improvements on land

[4] Daly, H. E., and Farley, J. C., 2004. Ecological economics : principles and applications. Island Press, Washington, D.C.

[5] Vermont. Vermont Department of Public Service. Utility Facts 2006. Aug. 2007. Feb. 2008 <http://www.publicservice.vermont.gov>.

[6] This is based on the principal that polluters are collecting rent. Tony O'Brien calculated that 7% ($10 Billion) of Australia's resource rent can be attributed to pollution, more specifically, emission and pollution fees paid by industry.

[7] Surface water in Vermont can be considered a common property resource or a common-pool resource. A common pool resource is one that is difficult to prevent access and is subtractable (ones use leaves less for others).

[8] Champlain Water District Website. Water Rates. Retrieved 3/12/08, http://www.cwd-h2o.org/budget.html

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# Potential Revenue Collection Through a Single Tax on Land

*by Conor Casey*

While property taxes in Vermont have historically been quite high, it can hardly be argued that they effectively capture the all economic rent generated through land monopolization. Decoupling the land and building evaluations from the property tax rate would be a good start towards more effective rent collections, but the actual amount of money generated will differ according to what calculations are used. This paper will explore a handful of options for calculation and collection of land rents in Vermont, and arrive at a conclusion based on the best empirical evidence available weighted by pragmatic and ethical considerations.

Before going headfirst into calculations, it's first important to establish what the attractive attributes of public revenue sources are. For the sake of political expedience, this tax shift should contain revenue neutrality. Vermonters already have a high property tax rate which funds public education; any changes to funding will be heavily scrutinized by the citizens and politicians of the state. Furthermore, the taxes should be economically efficient, eliminating deadweight losses, correcting perverse subsidies and generally promoting healthy economic growth. Of course every economist knows that a tax can never truly accomplish any of these things, but collection of unearned income (economic rent) can. What's more, the tax should also have distributed equity, so the burden doesn't fall disproportionately on those with the least ability to pay. Finally, the tax should promote environmental protection. A land tax would accomplish this by discouraging sprawl and keeping people closer to cities.

Land taxes have a long historical track record, dating back to the French Physiocrats, who realized that because land was the basis for the entire economy, a single tax could support all the necessary functions of government. It took legendary economist David Ricardo to formulate the Law of Economic Rent, which explained how unearned profits were generated through land monopoly. Thomas Paine put forward a similar hypothesis in Agrarian Justice, by claiming that private property was a necessary condition for economic growth, but that the land itself was common property, being owed a use-fee. Finally, Henry George was able to make the connection between land speculation and poverty in his magnum opus Progress & Poverty, which explored the phenomenon of land speculators driving up prices based on the productivity of labor, enabling them to absorb all economic rent. This led George to believe that land must be treated as a common asset; rent could be collected either through nationalization and leasing, or through a single tax on land itself.

Because nationalization of land is a politically impossibility, a single tax on land is likely to be the most expedient form of collecting land rents. The question then becomes one of how to calculate rent values. In its simplest form, rent is any income earned above what is necessary to be paid back to factors of production. From the perspective of a land tax, this could mean subtracting the holding costs associated with ownership (taxes, interest on mortgage payments, maintenance, etc.) from the annual return on investment, and taking the difference. Although this form of rent collection would be distributed quite equitably, it would be difficult to make it revenue neutral as it's entirely dependant on factors of individual ownership, and therefore not readily quantifiable.

A slightly more crude way to calculate rent would be to look at the historical trend of median housing prices in the state over the last 20 years. According to the U.S. Census Bureau, median housing prices in Vermont (unadjusted for inflation) for the year 1980 fetched $42,200. Twenty years later in the year 2000, median home values had reached $111,500. Using the formula for compound interest, one arrives at a rate of appreciation of 5% yearly.

**[ ($111,500/$42,200)^1/20 – 1 ] x 100 = 5%**

Applying this 5% to the 2007 assessed value of land in Vermont would yield $1,071,297,288 in state revenue, representing a 44% increase in revenue generated from current property taxes. This value, of course, is largely misrepresentative of the actual appreciation

in land values, because, "the result is to understate per-unit housing values relative to, say, income per family, and thus to understate the taxable capacity of housing relative to personal income. That is because the mean out values the median. That in turn is because distribution of values is highly skewed." (Gaffney, 21) Sadly, statistical housing trends are commonly presented as the median rather than the mean. However even with under reported statistics a 44% increase in state revenue from property tax is likely to turn more than a few heads in the state legislature.

Recent trends in the housing market have given rise to enormous amounts of lost potential revenue through failure to collect economic rent. For the fiscal year 2000, the state of Vermont had an assessed land value of $5.4 billion across 159,486 parcels of land. Grand list reports from 2007 reported land values of $21.4 billion, a near quadrupling in less than 10 years. Of course, there were many factors that went into feeding this housing bubble, which could take up another paper entirely, however for the sake of parsimony they won't be discussed. Using these two values from the state grand lists, Vermont land values had a 21.72% compounded growth between the years 2000 and 2007. Were Vermont to cash in on this enormous flux of rent, the state could have generated $4.285 billion for the education fund, a number that would represent a 500% increase to the state education fund, and would eclipse the entire state budget. It should be noted that it is a point of much contention as to whether a single tax would have deterred the underlying speculation that inflated such an enormous bubble in the first place.

Of course none these numbers are entirely feasible because they represent only potential values, while ignoring a key tenant to valuation for public finance; revenue neutrality. Currently, the state lumps building and property values together and taxes both at the same rate. Because this study is attempting to collect economic rent, building values must be decoupled from land values and taxed less, or not at all. Because there is so much more value in buildings than there is in land, dropping building values from property taxes will mean a rise in the tax rate that is now applied only to land. Taking revenue neutrality into account, the state would still need to collect $740,822,540.61 on land whose value is now appraised at only $21,425,945,762 (as opposed to the $66,411,841,512 which includes buildings). Dividing the needed revenue by the appraised value gives us a tax rate of 3.45% statewide. This number represents the point of revenue neutrality, not total economic rent. It also doesn't take into account municipal property taxes which are added on after the state collects its' property taxes, and averaged 1.12% for the fiscal year 2007. Adding the two together yields a value close to 5%, a number close to historic median gains in Vermont housing prices.

Economic rent is something that's not easy to calculate with 100% accuracy. However, by looking at the available data and taking the context in which it was recorded into account, one can arrive at a reliable estimate for potential value. In the case of collecting Vermont land rents, the potential revenue is close to $1.07 billion compounded 5% annually. This represents a huge increase in revenue for the state, which could feasibly replace many other revenue sources in the state budget. Collecting economic rent from land is a perfectly viable way to fund most, if not all, state obligations. The only obstacle in the path of economically efficient rent collection is political will.

### Works Cited


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# Wind Rent: Possibilities

*by Susan Skalka*

## Introduction

The idea of understanding certain assets as public and part of 'The Commons' in order to then extract value for the public in terms of public revenue and conservation is gaining recognition in policy discussions. Quantitative research on the value of common assets is needed to provide policy makers with the details needed for policy discussions.

*Vermont Wind* by Sabra Field

In my last paper, I described the current state of the wind industry and the existing and proposed wind facilities in the state of Vermont. I found that public revenue is generated primarily in the form of property tax payments based on the value of the land and equipment. A new bill has been signed that will change the way that taxes are calculated on the wind industry (for new facilities). Under the new model the tax is based on the Kilowatt-hours produced. In this paper, I will explore alternative methods for capturing public revenue based on the economic rent earned by the wind industry.

With the high startup costs typical of a new industry, with oil prices still relatively low, and with the existence of government price caps, there may not currently be a large profit margin in the wind industry. However, oil prices could quickly go up, laws, taxes, regulations and incentives could change to make wind energy more lucrative, or conceivably other types of events or disasters could occur which could lead to an increased demand and thus higher prices for energy produced by wind. Since there is a limited amount of oil, it is quite likely that at some point in the future, wind energy will become more valuable. Therefore, Vermont should be prepared to be in a position to take advantage of that when the time comes.

## Philosophical Justification

Before turning to possible approaches to collecting 'rent' from the wind industry, it is important to discuss the justification for such a proposal. First, 'economic rent' is defined as "the financial surplus created by the exploitation of natural resources, over and above the costs of exploitation (which include 'normal' profits).[1] Under the democratic theory of rent, governments should maximize their collection of rent to benefit the public, who own the resources.[2] However, under the liberal theory of rent, public resources should be made private and rent should remain in private hands.[3] Wind is a naturally produced asset, since no human can claim to have produced it. Likewise, ridgelines and viewscapes could be considered common assets to be shared by all, even if not owned publicly. Wind flowing across or above land is comparable to water in a river or stream flowing across land, and surface water is already considered a public asset. Finally, wind is an asset that can be used to produce energy, just like oil, and if Alaska can take royalties on oil profits, taking royalties on wind profits would be analogous. The only difference, of course, is that oil is finite and wind is renewable. Finally, if we take the analogy to an extreme, if wind energy were the only source of energy for electricity production and thus the demand was very high and all the profits went to the wind-power producers, they would be in a similar position as the oil industry is now in, where they are able to make huge profits based on the usage of common resources, which seems rather unfair. In sum, conceptually, the idea of capturing economic rent from the wind industry seems to have

solid justification, and there have been precedents for the similar capture of rent in other industries, namely the oil industry.

## Economic Rent in the Wind and Oil Industries

Economic rent in the wind industry could be defined as the profits that would be made over and above the 'normal' profit, that which results from price changes that have nothing to do with the amount of effort put into the production of wind energy. For example, scarcity of favorable land or scarcity of energy for electricity could push up the price of wind power and increase profits for a wind company, even if everything else remained constant. Note that wind companies can earn money from the sale not only of the power, but also from the sale of RECs- renewable energy credits, whose value can also vary for similar reasons. This is very similar to how economic rent is conceived of in the oil industry. This quote describes rent in the oil industry:

In the context of the oil and gas industry, economic rent is the difference between the cost of exploration, field development and extraction, and the final market price. According to Mr. Warnock, ***"These costs include a normal rate of return on investment."*** In other words, oil and gas companies have already made their profits even before the calculation of rents. The remaining economic rent is extremely valuable. It's up for grabs, and who gets it and in what proportions becomes a political contest between public authorities and private interests.[4]

Of course, there are differences between the oil and wind industries. First, wind energy is renewable and wind turbines do not deplete natural resources. Second, wind energy has few negative externalities unlike the oil industry. Third, the wind industry is just getting started and has a lot of start-up costs right now while the oil industry has already paid off most of the big initial investments. For these reasons, Vermont and other governments may be hesitant to impose additional fees or royalty schemes on this industry which most agree should be encouraged. The new law, which will tax energy production instead of profits arguably does not encourage increased production since it imposes a cost on production instead of taking royalties off of the top of profits. Vermont should encourage the production of this renewable source of energy that has few negative externalities. As this quote illustrates, we do not know exactly what the future might bring:

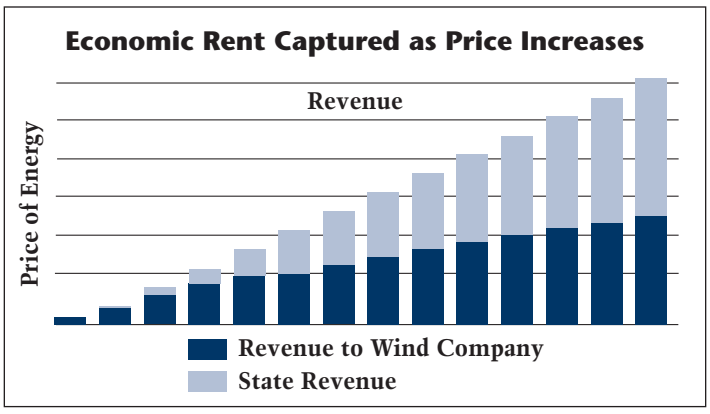
> *One can guess (based on experience with other technologies) that the eventual push to full commercialization and deployment of the technology will happen in a manner that no one can imagine today. There will be a "weather change" in the marketplace, or a "killer application" somewhere that will put several key companies or financial organizations in a position to profit. They will take advantage of public interest, the political and economic climate, and emotional or marketing factors to position wind energy technology […].*[5]

We need to be prepared for the future, when the wind industry will be more firmly established, by having the fiscal structures in place for the State of Vermont to be ready to benefit along with the wind industry from increased profitability in the wind industry.

### Methods

There are numerous fiscal structures that can be used to capture economic rent. Many of these are illustrated in the oil and gas industry. Of course, rent capture is much easier in state-owned enterprises, but that is not the direction we are going in Vermont. Royalties taken can vary, for example in Saskatchewan the Heritage fund captures less than 14% of sales yet other countries capture as much as 50% of sales in the OPEC countries. Some argue that the economic rent capture should vary based on the state that a project is in. Initially, the rent capture should be low so that the facility can become established, then, after it is established, the royalties collected should increase. As the facility ages, it might be necessary to drop the royalties collected in order to allow the facility to make capital investments as the equipment ages and needs replacement.[6]

Another method that a number of counties use in the oil industry is known as a progressive profits tax (PPT) in which the percent of royalties collected rises as profits do.[7] For example, in OPEC countries, as the international price of oil increases, the share going to the government increases, and they are thus able to capture almost all increases in economic rent, according to *Petroleum Intelligence* weekly.[8] In Ecuador, the government created an excess profit tax, which yields the government 50% of all gross income when the international price of oil rises faster than a threshold level set by the state.[9] The graph below illustrates how this might look.



A similar model could work for the wind industry in Vermont. A fiscal structure that includes the following should be considered:

- After profitability reaches a certain level, royalties must be paid to the State or to a particular fund that is set up. The usage of this for revenue or contributions to a fund would have to be determined.
- The percent of royalties taken should increase as profits increase.
- The fiscal structure should take into account the state of the facility: new projects that are just getting started would have to pay less in royalties than those more firmly established; those that are aging would also be given breaks.

Note that there are many mechanisms for encouraging renewable energy production, such as feed-in tariffs that force utilities to pay a higher price for renewable energy, thus increasing the income of the renewable energy generators while distributing the increased cost over all consumers. While this is a good incentive structure for increasing the production of renewable energy, it is not necessarily a method of rent capture, which is what I am exploring in this paper.

### Estimates for Discussion

A 2002 REV Study* estimated that VT could produce 10% of its electrical energy from six wind farms with about one-hundred-fifty 1.5 MW wind turbines, totaling 225MW. Vermont net generation recently is 7,084,344MWH/year (EIA). Ten percent of that figure equals 708,434.4MWH/yr or 708,434,400 KWH/yr

### Checking that figure:

225,000 kW x 24hrs/day x 365 days=1,971,000,000 KWH/yr
x .35 (capacity factor) = 689,850,000kwh/yr
X * 5.6 cents per kWh est. **cost* = $38,631,600**

Assume 6.6 cents per kwh* selling price** x 689,850,000kwh/yr
**= $45,530,100 - $38,631,600 = $6,898,500.00 economic rent**

Assume 10.6 cents per kwh* selling price** x 689,850,000kwh/yr
**= $73,124,100 - $38,631,600 = $34,492,500 economic rent**

Assume 30.6 cents per kwh* selling price** x 689,850,000kwh/yr
**= $211,094,100 - $38,631,600 = $172,462,500 economic rent**

*from:*
http://www.revermont.org/windfarm_benefits.pdf*
http://sciencepolicy.colorado.edu/moveabletype/mt-comments.cgi?entry_id=850**

## Conclusion

Before any exact numbers could be determined, an economic analysis would be necessary to determine what constitutes normal profits, when the industry is expected to become profitable enough for the State to start capturing economic rent, the effect of price and profit caps on the electricity market, the effect of existing subsidies, and predicted future prices for other sources of electricity production. We would also need to determine how a similar setup could be applied to the sale of RECs, but again, analysis would be needed to determine the best way to do this, if is indeed feasible. Using our crude estimate above we find that depending on future electric rates, wind power could generate $6.8-172 million per year in future economic rent. In conclusion, economic rent from the wind industry does seem to be a potential source of revenue for the state or the citizens of Vermont. My recommendation is that, given the complicated and changing nature of the energy industry, more research be done by those that are familiar with the economics of the utility and energy industries.

[1] Selling the Family Silver: Oil and Gas Royalties, Corporate Profits and the Disregarded Public.

[2] Ibid.

[3] Ibid.

[4] Open Spaces. 11/29/2006. Downloaded March 28th, 2008 from http://opening-spaces.blogspot.com/2006/11/so-where-does-that-oil-and-gas-rent.html

[5] The Future of Wind Power. Downloaded April 5th, 2008 from http://www.telosnet.com/wind/future.html.

[6] Ibid. p. 28.

[7] Ibid. p. 30.

[8] Ibid. p. 61.

[9] Ibid. p. 63

## Estimate of Total Revenue Potential from Common Assets in Vermont

| Asset | Current Revenue (Million $) | Potential New Revenue (Million $) | Increase (Million $) | Source |
|---|---|---|---|---|
| **Air/transport** | 209 | 7-153 | 7-153 | carbon permits |
| **Air/heating** | 17 | 4-93.6 | 4-93.6 | carbon permits |
| **Air (total)** | 0 | 25.9 | 25.9 | carbon permits |
| **Fish and Wildlife** | 14.7 | 10.4 | 10.4 | fees |
| **Forests** | Net loss | 3.2 | 3.2 | depletion fees |
| **Ground Water** | ~0 | 107.9 | 107.9 | bottlers |
| **Internet** | ~0 | 30 | 30 | ISPs & domains |
| **Spectrum** | ~0 | 375 | 375 | annual auction |
| **Minerals** | 3.7 | 9.7 | 6 | royalties |
| **Surface Water** | ~0 | 31.2 | 31.2 | user fee |
| **Land** | 741 | 1071 | 330 | land rent |
| **Wind** | .75 | 5.5 | 4.75 | progressive rent |
| **Speculation*** | (capital gains?) | 269 | 269 | .25% Tobin tax |
| **Seignorage*** | ~0 | 35.7 | 35.7 | 1% of loans |
| **TOTAL NEW REVENUE** . . . . . $1.229 billion/year | | | | |
| **PER CAPITA DIVIDEND** . . . . . $1972 each/year | | | | |

* *Note: The Stock and commodities markets are socially created common assets, as is the monetary system. The right to create money is a government privilege granted to the private banking system, which creates 93% of the money in the US through loans. Potential revenue from speculation and monetization (seigniorage) were estimated in a previous UVM study. A Tobin tax of .25% was applied to all financial speculation. Economic rent of 1% was applied to all bank loans, which represent money creation.*

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