LOCAL POWER:
Energy & Economic Development in Rural Vermont

The Vermont Council on Rural Development
Roundtable Conference

Exploring Opportunities for
In-State Fuel Development and Power Generation

Lyndon State College - August 22, 2006

Final Report

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I. Executive Summary

Each year, the Vermont Council on Rural Development (VCRD) produces a Rural Summit to bring Vermonters together with state and federal officials, and business and non-profit leaders to consider strategies that can advance rural community and economic development. Charged by the federal farm bill to help coordinate state and federal rural policies in Vermont, VCRD serves as the neutral convener and facilitator of public dialogues at the state, regional, and local level to help diverse parties and interests work together in support of viable and sustainable rural communities.

VCRD chose the subject of the 2006 Summit process based on deep and widespread concerns in Vermont today about global climate change, our dependence on oil, "peak oil," and perceptions of the growing challenge of national energy policies. Paralleling global and national security concerns are the questions on the future of Vermont's energy supply, re-licensing the Vernon Nuclear plant, future Hydro-Quebec contracts, the high cost of gasoline, and price of heating oil.

VCRD organized the 2006 Summit conference not to answer all these challenges but to consider together ways to move the mark on in-state generation, fuel development and efficiency -- to expand energy as an economic sector providing major opportunities in rural Vermont. What combination of conservation, efficiency, in-state electric generation and fuel development will effectively provide the greatest leverage to support the prosperity, sustainability and viability of Vermont communities—and, especially as we look at our natural resource capacity for energy, the fate of the state's most rural communities?

The 2006 VCRD Rural Summit, **"Local Power: Energy& Economic Development in Rural Vermont"** was developed with the goals of:

- Defining opportunities for advancing in-state energy development
- Building starting points for the deliberations of the newly-formed Vermont Rural Energy Council (VREC)
- Bringing together entrepreneurs and developers of the energy sector with policy leaders and supporters
- Considering policies and investments needed to expand the sector
- Setting recommendations for VREC, the VT Legislature, and Gubernatorial consideration

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The 2006 VCRD Summit featured presentations by key Vermont leaders including Governor Douglas, Senator Patrick Leahy and Lieutenant Governor Brian Dubie. (Copies of some of these presentations are available at the VCRD web site: www.vtrural.org).

Senator Patrick Leahy opened the Summit with a call for a pro-active national policy to promote renewable energy and end America's dependence on foreign oil. The Senator

rejected "business as usual" in energy policy and called for a clear national and state commitment to clean energy development.

At the conference luncheon, VCRD recognized **Edgar May** of Springfield with its annual Vermont Community Leadership Award (see the appendix at the end of this report).

During lunch, **Governor James Douglas** spoke of the importance of renewable energy to the future of the state and outlined the strong initiatives Vermont is undertaking to address climate change, support biomass and agricultural generation, and advance efficiency and conservation. Governor Douglas championed the goal of "25 x 25," producing 25% of Vermont's energy needs from renewable farm and forest resources by 2025.

Daniel Reicher, of New Energy Capital, then spoke of the importance of advancing efforts on the "three points of the triangle," of policy, technology, and investment, to promote clean and renewable energy solutions, and overviewed progress and opportunities in states throughout the country.

At the end of the day**, Lieutenant Governor Brian Dubie** closed the energy summit by celebrating innovation in Vermont, championing the "Vermont Green Valley" concept and emerging opportunities in the energy sector, and positing a key role for utility–scale wind in the future of Vermont's energy portfolio.

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At the Summit a diverse and engaged group of over **350 participants** shared their expertise and ideas on expanding economic opportunities in the rural energy field in 11 separate work team sessions. These included focused discussions on the topics of: **Vermont Solar, Hydro Opportunities, Developing Utility-Scale Biomass, Farm Based Methane, Transportation and Bio-Fuels, Waste to Power, Efficiency & Conservation, Co-Gen & Distributed Generation, Community & Household /Business Wind, Creating the VT Green Brand and Community Energy Planning.**

The deliberations of these working groups form the core of this report, and the priority recommendations from their discussions are listed below.

Central to all VCRD conferences are facilitated "roundtable" discussions and strategic assessment sessions where all participants are equal and VCRD mediates what is, in effect, a "marketplace of ideas." As convener and facilitator, VCRD is careful to remain neutral in these conversations and to provide a structure where ideas can develop and contend against one another. VCRD then serves as a non-partisan reporter of the outcome of group discussions, neither endorsing nor rejecting the ideas, opinions, or recommendations expressed. Ideas stand alone and succeed or fail on their merit to convince. The compilation of ideas and recommendations contained in this report represents the thinking of some of Vermont's key entrepreneurs, community leaders and officials, and is presented for the use of participants, Legislators, and the Gubernatorial

administration, but does not constitute a set of positions adopted by the Vermont Council on Rural Development.

That said, the 2006 Summit was a major success in drawing together some of Vermont's key entrepreneurs, investors and policy leaders to define the exciting opportunities ahead. Vermont is well situated, both by its brand identification and human and intellectual capital, to be a leader in rural energy and economic development. The Summit discussions reflect and celebrate the progress we are making today and the dedication Vermonters share to realizing the opportunities ahead.

Priority Recommendations of the Conference Working Groups:

A. Utility Scale Biomass

1. Vermont should engage a statewide siting process to identify the most desirable locations for utility scale biomass that include considerations of: forest resources, energy needs, efficient uses of wood energy, such as co-generation options, and community acceptance.
2. Establish a price stabilization policy for utilities and investors based on matching projects with the guidelines established above, and on the use of efficient technologies.

B. Co-Gen and Distributed Generation

1. Review and identify legislation to help standardize and streamline projects. Develop a national standard on interconnections to the electric grid. Differentiate between a 'small project' and a transmission/distribution system by providing clear definitions of both.
2. Financial challenges must be addressed through state-supplied incentives, gap financing, perhaps with public money, and community investment.
3. Designate an ombudsman to facilitate projects from start to finish.

C. Community Energy Planning

1. Create a sense of urgency in order to increase public engagement.
2. Provide technical assistance and capacity-building resources to existing local entities and boards:
    - Grants, information, case studies, resource directory
    - Small-scale grants for community-level energy planning and implementation

D. Efficiency and Conservation

1) A public education campaign should be launched that includes best practices and covers all energy areas.
2) Creative funding and incentives for efficiency should be pursued.
3) A long-term (20-year) comprehensive plan for expanding efficiency and conservation's infrastructure in Vermont should be developed.

E. Creating the VT Green Brand Around Energy

1. Education: Increase investments in post-secondary education and workforce training to support the green building industry. Increase public awareness about existing renewable energy technologies and future opportunities.
2. State and municipal governments must demonstrate leadership by buying green, from building materials to vehicles and fuel.

F. Hydro Opportunities

1. Change federal and state laws to reduce barriers to small hydro. Specifically, on the federal level, add Vermont to Alaska's exemption, under the Federal Power Act, from federal jurisdiction of hydropower projects less than 5 MW. These projects would then

only be under the jurisdiction of the State of Vermont. On the state level, change laws or regulations to provide a fast-track permitting process for small hydro projects.
2. Create a Hydro Task Force to provide technical assistance with permitting and financial incentives (or update and maintain a current directory of available financial incentives), and assess the feasibility of the 150 potential hydro sites in various federal and regional studies.

G. Farm Based Methane

1. Fully fund the 2006 Farm Bill, section 9006, and increase the availability of capital funding by creating a revolving fund to help farmers invest in technology.
2. Cost Share Policies: A statewide "must take price" for utilities should be established; eliminate the 1% cap on net-metering; develop a tariff for net-metering; guarantee farmers and customers access to a premium power company; and establish broad-based 3 phase-access for all

H. Vermont Solar

1. Educate Vermonters that solar power has a role in meeting our energy needs, and that solar power works in Vermont. Increase training and incentive programs with the goal of changing the culture around solar energy.
2. The Legislature should increase and provide financial incentives that will encourage homeowners to install solar power. Zoning and permit changes should be enacted that make solar power a more viable option for builders, and the Legislature should establish a tiered rate system, with tiered costs for power depending on the amount of electricity used each month.

I. Transportation and Biofuels

1. Require a '2-5-10'-fuel standard by 2008 (2% biodiesel in on-road fuel, 5% biodiesel in off-road and heating fuel and 10% ethanol in gasoline)
2. Conduct up to 10 pilot projects around the state to demonstrate the economic viability of in-state biofuel production, and establish investment data for farm scale, local scale, or commercial scale operations. The Clean Energy Fund and the Pension Fund could fund these pilot projects.
3. Create an efficiency utility for liquid and transportation fuels. Include conservation strategies.

J. Waste to Power

1. Inventory available technologies and waste material available that can be converted to power, and assess economic incentives to expand viability.
2. The State should act as a facilitator and educator in collaborative efforts that will position the people of Vermont to adapt to new technologies in waste-to-power.

K. Community, Household and Business Scale Wind Power

1. Realizing the economic development potential of wind generation at all levels in Vermont will require Gubernatorial leadership in defining the appropriate scale for Vermont, building state plans to promote possible developments, coordinating regulatory review, and evaluating the potential for incentives in line with Vermont goals.

2. Public Education around energy issues will be crucial to Vermont's long-term economic viability. Renewable energy education, founded on teaching about the global challenge presented by climate change, should be included in Vermont curriculums including elementary, high school and college. State colleges should build curricular offerings to make Vermont a leader in advancing a broad array of renewable and clean energy generation.

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The Vermont Council on Rural Development has convened a year-long policy council, the **Vermont Rural Energy Council (VREC)**, charged to produce a systematic and strategic action plan to expand energy and fuel development in Vermont. VREC will employ this summary of the 2006 Summit as a foundational document as it evaluates and develops systematic recommendations to advance in state energy (the charge and membership list are available at the VCRD web site at www.vtrural.org). Findings from the "Local Power" Summit will serve as seed ideas toward its conclusions, and add impetus and urgency to VREC deliberations.

II. Panel Discussion:
"Realizing the Opportunities for Vermont Power"

A panel discussion on Vermont's potential for fuel development, efficiency and energy generation opened the work of the Summit. With presentations and discussions by leaders in the energy field, the panel set some context around the importance of and opportunity for in-state generation and development, and built starting points for the work teams throughout the day. Panel members included:

Dr. Alan Betts, VT Academy of Science and Engineering
Jim Volz, Public Service Board
Laurence Mott, Earth Turbines, Inc.
Avram Patt, Washington Electric Coop
Beth Sachs, Vermont Energy Investment Corporation
Paul Costello, VCRD, Moderator

Panelist Summary Remarks

Dr. Alan Betts, *Vermont Academy of Science and Engineering*

Vermonters need energy to heat our homes; power our lights, machines and computers; fuel our cars and tractors. A large part of it comes from oil and other fossil fuels; and these are becoming very costly.

One cost you are very familiar with: the cost of gas, diesel and heating oil, which has doubled in the past year or two. Consider oil. Oil is becoming very costly, because demand is close to supply. We are approaching the peak of the global oil production. Production is vulnerable to hurricanes in the Gulf of Mexico, leaks in the Alaska pipeline and wars in the Middle East. Use by countries like China, who now dominate the world's manufacturing, has been growing rapidly. The US is very inefficient in its use of oil and energy in general.

The second global cost of our dependency on burning fossil fuels is that CO_2 is a potent greenhouse gas. It traps the earth's heat radiation, driving the earth to a warmer climate. Global temperature has risen 1.3 degrees F in the last century, and if we continue with business as usual till we run out of oil, gas, and coal, then the global temperature will rise about five degrees F this century - more in northern latitudes. The fossil fuels are stored carbon taken out of the earth's atmosphere over 100 million years and we are putting most of it back in a century or two. Remember that it was the discovery of the potential of burning fossil fuels that drove the industrial revolution. Dealing with global warming is a pressing need.

Five degrees F may seem small, when temperature changes this much from day-to-day, and more than this from summer to winter; but in the annual mean it is huge. This is a bigger mean change than the earth has seen in millions of years. For Vermont it would mean the end of our maple forests and skiing. It means the melting of the northern icecap, all sorts of extreme weather and climate catastrophes, as the climate system is rather unstable. It will set in motion the melting of the Greenland and western Antarctic icecaps, which will mean huge rises in sea-level, flooding coastal areas. How much of

this we will see in this century is still uncertain; but all the indications are that the melt is accelerating.

The US signed the UN Convention on Climate Change in 1992, but we have delayed taking action for 15 years; and we must now act this decade. It is critical that we stop building an energy inefficient infrastructure for our society. It is a very big task, as it means a reduction in fossil fuel energy use of more than 20% every decade for the next 50 years, when we are used to having an increase every year. But don't be disheartened; we already have the technology and resources to do this.

The bottom line is that if we can give Vermont an efficient energy economy based on renewable sources, it will mean jobs here in Vermont, dollars in our pockets and in our economy; and we buy time for the earth, its oceans and its biosphere, which is in a race to adapt to a warming climate.

Jim Voltz, *Vermont Public Service Board*

How do we get our environmental and regulatory objectives aligned with economic objectives so that in-state renewable generation is economically viable? If renewable generation isn't competitive, it won't be built. If it is built and is too expensive, there will be a backlash against it. We don't want to repeat the mistakes of the small power program that we implemented in the 1980s that saddled ratepayers with very high priced power and caused the program to be closed prematurely.

There is a tension between the least cost, and the current real cost of renewable in-state generation. Act 61 tries to address this problem in two major ways:
(1) With the threat of the imposition of a renewable portfolio standard if load growth between now and 2012 isn't met by renewable generation.
(2) With the creation of the SPEED (Sustainably Priced Energy Enterprise Development) Program, which is meant to encourage renewable generation in Vermont by providing a program through which renewable generators can sell their power. Act 61 specifies that this program must be at or below the market price for power. The PSB has recently filed a proposed rule implementing this program with the legislative rules committee and hopes to have it in place by the end of the year.

It is important to consider how we can get the power from renewable generation – located in rural areas – to the load centers, which are primarily urban areas. Do we build power lines? One approach is to size the rural generation so that it simply meets the load in the rural area, thereby freeing up utility generation to serve the urban load.

An expansion of net metering programs is in progress. PSB is considering group net metering. Group net metering and small satellite electric grids challenge the existing utility monopoly franchise–essentially someone other than the utility is selling you power. This can result in stranded costs. Because utilities plan over a long horizon, if they suddenly lose significant sales due to these programs they have to recover their costs from the remaining customers. This in turn creates upward rate pressure on the remaining customers as well as fairness issues.

Large cogeneration and combined heat and power projects raise similar issues. If large industrial customers begins self-generating, but still need back up power from the utility, what costs should be included in the rates for that back-up power? If the utility made commitments to serve that customer into the future, who should pay those costs? If the industrial customer pays them, you create a disincentive to build a CHP plant. If remaining ratepayers pay the costs, that may not be fair.

Lawrence Mott, *Earth Turbines, Inc.*

There are three topics to be discussed in these opening remarks on new opportunities:

1. Technology
2. Implementation of the technology
3. Timing: near term and long term

Technology is often seen as glamorous, exciting, and promising profit; however, we must always be careful to consider appropriate technology. For a small state like Vermont, one of our strengths is an opportunity to implement, practice, create acceptance for, and refine technologies, rather than compete with large companies carrying out research and development programs.

We have a short list of possible research and development opportunities, similar to what Northern Power has done with Power Electronics and direct drive wind turbines. These pure R & D areas may be in:

- Bio diesel processing, feedstocks, paints, and side product such as biowax
- Methane process systems
- Energy efficiency products
- Small to medium scale biomass gasification
- Wind power technology, especially small wind

In implementation, we may consider:

- Small-scale biodiesel plants (~4 m/gal/yr)
- Cellulosic ethanol
- Electric vehicles
- Public transit, even potential light rail on the existing western rail belt
- Wood gasification
- Biomass fired CHP in medium scale ~300 -500 kW
- Solar hot water
- Utility scale wind power-already mature, ready, and I believe, the best benefit for Vermont

The energy horizon is now, not far off and waiting for a breakthrough. Implementations of best practices, along with the best entrepreneurial and community spirit at work now will bring these technologies to acceptance among all Vermonters.

Avram Patt, *Washington Electric Cooperative*

Efficiency: Opportunities in efficiency are huge and must be considered up-front. The greatest opportunities, in terms of sheer BTUs, are in fuels—heating, manufacturing and especially transportation, because we've done so little. While Vermont's impact on vehicle and other engine efficiency standards may be limited we (and all Americans) should not give up in that area.

In electric efficiency our track record in Vermont is much better than others, in this country anyway, but estimates for how much more can be done cost-effectively (20% of our projected 2015 load) are not pie-in-the-sky. We are not yet on an investment track to achieve such levels.

Fuel Development: There is additional potential for use of woodchips for heating and manufacturing, and for electric generation. There is substantial activity in biofuels, and they provide potential both as a fuel source, and as a component in business /economic development and land use. Waste vegetable oil is a finite resource to be

tapped, but there is opportunity for significant conversion or expansion of agricultural activity towards energy farming.

In-state Generation: At the Co-op, we're pretty angry and I really had to carefully consider what to say here. Electric utilities like our Co-op have a very long-standing and solemn "obligation to serve," which in terms of the generation side of the business, means that consumers' demand *must* be met, and that the power *will* come from *somewhere.* That's not debatable for us.

Vermonters' peak electric load is 1,100 MW and growing and as everyone knows, in less than ten years 2/3 of our supply contracts will not exist as we know them. We must, and can maximize our in-state renewable resources, although we will continue to rely on imports and some non-renewable sources. Here are some important elements to consider:

- Conservation and efficiency first—the available resource is larger than we're budgeting for, and the investment is good for business.
- Small-scale renewables:
  - landfill methane
  - manure methane
  - new biomass, woodchip, co-gen
  - expanded net metering

Without in any way lessening the meaningful and expanding role of smaller scale and distributed generation, we must also make fuller use of all Vermont's renewable and sustainable resources. We should not be shortsighted in imagining and defining what "Vermont scale" means, or we'll be left more exposed and vulnerable than we should be to forces we cannot influence.

Beth Sachs, *VT Energy Investment Corporation*

Conservation and efficiency go hand in hand. Conservation is the preservation and careful management of resources so they are not wasted. I think it makes sense to consider efficiency to be a fundamental element of conservation. Using that definition, conservation has an enormous role in Vermont's future. We need to use energy as efficiently as possible and we need to use less of it to survive on the planet.

We have the means - the technologies and the capital – to reduce our overall energy use by at least 30%, and to save it more at less cost than supplying it. We need to achieve this 30% goal in electricity, oil, gas, and transportation fuel. For example, we need to design, build, and renovate our buildings to be 50% better than code requires. We need to figure out how to use our land and develop our communities to rely less on traveling in our cars.

Conservation goes beyond efficiency. The U.S., with 5% of the world's population, uses 25% of its resources. That is not sustainable. We need to each think about our own practices – at home and at work – and how we might consider using less, in addition to using it more efficiently. Not just efficient light bulbs, but turning off lights and only using what we need. Not just driving a higher-efficiency car or a biodiesel blend, but carpooling or working close to home. Not just building a super-efficient home, but buying a super-efficient *smaller* home.

We have to act more boldly and more quickly than ever before to curb the climate change we are facing. How can we encourage conservation & efficiency? What is the

role of government? Public education? Business? How might we use education, incentives, codes & standards to encourage conservation & efficiency?

Are there business opportunities for entrepreneurs in this sector? Yes, there are! We can't make the transition to a sustainable energy future without the infrastructure to deliver the services. Efficiency initiatives stimulate work for a whole range of businesses - HVAC & air-sealing contractors, architects, engineers, retail & wholesale equipment suppliers, performance contractors, commissioning & retro-commissioning specialists, home performance contractors. We need more and better-trained energy-related service providers. And it's good for the Vermont economy…70% of dollars we spend to purchase energy leave Vermont; 70% of dollars spent on efficiency stay in the state.

III. Working Group Reports

Summit participants registered for roundtable sessions in the following 11 work groups. Work group sessions opened by a brief presentation of issues and opportunities within each focus area by a business or policy leader. Each group then spent time evaluating the current status of their topic in Vermont today, considering the challenges the sector faces, and developing a set of recommendations that could help Vermont realize the opportunities in the sector. In the end, Work Groups selected two of these recommendations to report to the plenary session of the conference.

1. Utility-Scale Biomass

Facilitator: Brian Keefe, *Senator Jeffords' Office*
Opening Speaker: Dave Lamont, *VT Department of Public Service*
Scribe: Helen Jordan, *VT Council on Rural Development*

Introductory Remarks, *Dave Lamont*

As energy moves to a more competitive market where we don't rely only on utility owned plants, biomass begins to look more attractive. Some terms to be mindful of are contained in this equation:

Return = Revenue (Energy: Capacity: RECs) – Costs (Capital: O&M: Fuel)

Costs: A major risk is changing wood prices. Wood fuel doesn't move in response to other energy markets, for example, papermaking affects wood costs, and so the cycles aren't aligned.

Revenues: There are more risks on this term of the equation than for costs.

Energy: Energy forecasts are very uncertain. New England electricity prices depend largely on natural gas prices, which are affected by exploration for sources and by controversy over where and when liquid natural gas facilities can be built

Capacity: There is a new system, the Forward Capacity Market, where potential developers bid in a price they want to get for their capacity 3 years from now, then the developer is chosen in an auction process.

RECs – Renewable Energy Certificates are a market created by states' portfolio standards, which require utilities to acquire a certain amount of energy from renewable sources. The value of RECs depends on state policy as well as supply and demand.

Moving forward, given a more competitive energy production market, providers are assuming more risk while consumers assume less.

Points of Testimony

A. Opportunities and Challenges

Opportunities

- Biomass should be defined as a variety of fibers; not just wood pellets, but other agricultural products such as grass pellets.
- Utility-scale is generally understood as 10 – 60 MW.
- Vermont has a lot of trees – it's the third most forested state and has a history of harvesting.

- There is a mix of ownership for the forests: federal, state, private, conserved.
- The Biomass Energy Resource Center is studying fuel availability in the state and expects to publish its report in fall of 2006.
- Renewable energy funds are available to put money into green energy.
- The public has an increased acceptance of using trees for fuel. Rather than being perceived as an environmental problem it could be a pro-environmental initiative.
- Legislative action, like the SPEED Program, encourages green energy development.
- There are dormant farm fields as well as forests not being harvested that can be used to supply biomass.
- Biomass can introduce more stable prices than fossil fuels. Although it should be noted that prices for wood chips tend to fluctuate depending on what other wood-using industries are doing in a region (for example the Berlin paper mill).
- Gasification could potentially increase efficiency, but much more work is needed on large-scale applications.
- Wood sales for energy are an opportunity for landowners who want to earn money from their land.
- The state is getting better at managing forest health.
- Ethanol from cellulose could be an opportunity.

Challenges

- The best use for wood is not energy production. Prices are better in different markets, including for low-grade, pulp wood.
- Utilities rely on waste wood. McNeil looks first at commercial and small-scale waste, such as Christmas trees, sugar wood maintenance, by-products from other harvests, and downed wood (although this last is important for forest health, and so should not be considered as entirely waste wood).
- Wood fuel purchasers rely on other markets to pay the majority of the costs for extracting each tree. At the same time, these uses need to leave some waste from each tree for the forest to use.
- Biomass doesn't react well to fluctuations in market prices and demand.
- The length of contracts to people providing wood chips is a problem; the bank loans for equipment extend over 10 years while the contracts to sell are only about two.
- The biggest limitation to using biomass is getting access to the wood. Parcel size, turnover, and a variety of other factors limit access.
- The biggest cost for utilities is transportation, and the larger the plant, the more fuel it needs and the farther away utilities need to go to bring the wood in. That limits the size of plants. McNeil, for example, brings in wood from within 50 miles; they will go up to 75 miles out.
- Proving a secure wood supply for electricity generation is sometimes difficult and that uncertainty makes it hard to get investment dollars and to receive regulatory approval.
- It is more efficient to use biomass for producing heat than electricity.
- Wood plants are challenging for co-generation. Co-gen plants are sited near areas of high demand, but that demand isn't concentrated near the wood sources.

- Healthy forests need to retain their renewal capacity. That capacity is impaired by a variety of environmental stresses, including water quality, invasive entities, acid rain, and global climate change.
- We can manage wood lots to get good growth from the trees we want, but the health of single trees is not the same as an overall healthy forest.
- Siting plants is a major challenge. Larger plants have greater economies of scale, but they can't feasibly be sited near population centers.
- The infrastructure for harvesting forests is in crisis. Small operations are going away, individuals are aging.
- Rapid-growth biomass introduces technical problems when burned– it produces a lot of ash that liquefies easily on the grates.

B. <u>Recommendations</u>

- The future of energy from biomass will be smaller-scale plants (~4 MW), which are suitable for co-generation.
- It's important to have a mix of scales and applications for energy from biomass.
- If Vermont looks at smaller biomass facilities we should keep in mind air quality issues. It is easier to install air quality controls at a single, large site.
- Look at ethanol from cellulose.
- We need to consider the trade offs between producing electricity and heat. For example, about 200 buildings the size of a 1,000-student high school could be heated with the same quantity of wood used by the Ryegate plant.
- Wood is a renewable resource, but we still need to be mindful of our rate of extraction. We should consider wood a finite resource and maximize the number of BTUs delivered to the consumer.
- There should be a society-wide discussion of best uses for our wood resources, including how much wood should be harvested.
- The price point for wood for energy should be closer to commodity prices, not the current system of taking scrap after all other uses have been exhausted.
- There needs to be a way to end the short-term cycles for wood prices so that banks will feel more comfortable investing in harvesting operations.
- There should be loan guarantees for investing in wood harvesting for energy, like farm loan guarantees.
- Vermont needs procurement standards that go above and beyond current standards to maintain forest health.
- Invest in more efficient, nimble equipment. Build incentives for business plans to incorporate appropriate technology.
- Guidelines for the proper size and siting are needed.
- Finding a location for biomass plants should always include considering heat applications. This could include creative solutions, such as combining plants with greenhouses that can use the waste heat.
- Modify SPEED to give more support for investment in harvesting equipment.
- Once a plant is built, the volume of wood required to feed that plant must be sustained. If there are no comprehensive feasibility studies before building these plants, better use of the wood could be blocked or could lead to unsustainable harvesting.

- The technology for utility-scale biomass has room for improvement; it is expected to become about 50% more efficient over the next 20-30 years. Experimental plants that push that envelope should be encouraged, and are likely to garner more support.
- There have been studies done on wood supply in Vermont - BERC is also about to publish their supply study - but we still need a better study of demand.
- Vermont needs a more meaningful Renewable Portfolio Standard.
- Our first priority should be projects that keep our forests healthy and wood available. Without productive forests, utility-scale biomass is a moot point.
- Utilities should offer longer term contracts to wood chip providers.

C. <u>Priority Recommendations</u>

1. Vermont should engage a statewide siting process to identify the most desirable locations for utility scale biomass that include considerations of: forest resources, energy needs, efficient uses of wood energy, such as co-generation options, and community acceptance.

2. Establish a price stabilization policy for utilities and investors based on matching projects with the guidelines established above, and on the use of efficient technologies.

2. Co-Gen and Distributed Generation

Facilitator: Ellen Kahler, *VT Sustainable Jobs Fund*
Opening Speaker:Jim McNamara, *Northern Power Systems*
Scribe: Brenda Hausauer, *VT Council on Rural Development*

Introductory Remarks, *Jim McNamara*

Distributed Generation (DG) or On Site Generation is the concept of generating power at smaller "distributed" sites that are closer to the point of load than traditional large central plants that then have to distribute power long distances over miles of transmission wire. Because only 1/3 of the energy value in a fuel goes into creating electricity and 2/3 goes in to creating heat, large central plants are very inefficient as they have no use for this heat and therefore just vent it to the atmosphere. By generating power on site, the waste heat can be captured and used locally to make hot water or steam that can be used for heating or cooling in a configuration known as Cogeneration or Combined Heat and Power (CHP). This in turn displaces fuel that would normally have to be purchased to meet these thermal needs resulting in a net efficiency of up to 85%. Customer benefits of combined heat and power systems include cost savings, reduced emissions, a waste disposal alternative, the possibility of emissions credits, and enhanced reliability. Benefits to the utility include a reduced load, reduced NIMBY issues, improved network reliability, better homeland security, improved power quality, and fewer line losses. A CHP project is not just a new generating system, but also an advance in efficiency, conservation, and security.

There are barriers to the successful deployment of combined heat and power systems as well. Many utilities lack a standard electrical interconnect, making it more difficult for co-generation systems to connect with the grid. Utilities often charge unfairly high standby rates for power still purchased by the customer with onsite generation and net metering is often limited which in turn limits the economical size of the on-site generation asset. On-site generation systems represent a sizeable investment, which many end-users are reluctant to make, despite the possibility of significant savings resulting in attractive paybacks. Difficulties in interconnecting, permitting, and meeting increasingly restrictive emissions standards can drive already high installed costs up. The economics are further compounded by recent volatility in the natural gas market, which makes it difficult to predict the savings from onsite generation.

However, there are reasons to be optimistic about the future of onsite generation. Standardized electrical interconnect requirements are increasing in use among utilities, greatly simplifying the interconnect process. Incentives are available in an increasing number of states as are federal tax credits, which serve to reduce the capital cost of these systems. Many utilities are taking a least cost approach to adding generation which often favors distributed generation and CHP over central plant generation. Regulatory efforts which de-couple utility's profits from number of kWh sold are also making utilities more likely to embrace DG as it no longer represents a direct threat to their bottom line. As gas prices have remained high, electric prices are also on the rise, which widens the gap between the cost of energy from the utility and the cost of energy, generated on site (known as the "spark spread"). Finally, new technologies are allowing customers to turn waste products into fuels and energy, which not only utilizes a low cost and stable "fuel" but also creates savings from avoided disposal fees and creates Renewable Energy

Credits, which can be traded on the open market in states with Renewable Portfolio Standards.

There are numerous success stories in the waste-to-energy field, which point to the increasing market for this technology. At SC Johnson in Wisconsin, the company had an internal mandate to reduce its CO_2 emissions across its global operations. Northern Power Systems did a scoping study for them that showed methane from a nearby landfill at their Racine Wisconsin manufacturing facility could be used to generate electricity and steam for use at their plant. The emissions reduction from this plant alone allowed them to meet their CO_2 reduction goals for their entire worldwide operation. At another project, a cardboard recycling company will be using waste sludge for most of their power, generating significant savings and eliminating a costly waste disposal problem. With many projects, companies can get 50%-75% of their power from waste.

Points of Testimony

A. Opportunities and Challenges

Opportunities

- Organic Rankine Cycle systems utilize a modified steam turbine with a more volatile liquid so it boils at a lower temperature. This can be a very attractive technology for waste heat. There are three companies that make this in the US and it is a fairly mature technology.
- If you custom engineer a system, it's more expensive, and below a certain size economies of scale are lost. In some states, there are small CHP packages that have been pre-approved which make the economies of smaller systems more attractive.
- Companies can build redundancies into their systems, avoiding the problem of high standby rates from utilities.
- There are three types of onsite power projects: 1. Islanded projects, which are contained within a plant, and completely disconnected from the grid; 2. Projects that are connected to the grid, but "downstream" of the grid, so that power is not fed back; and 3. Projects that are connected to the grid and are pushing power back to the grid.
- There is a new technology made by Honda that works on a residential scale.
- Financial challenges of CHP projects can change if there are other positive factors, such as saving jobs. The Ethan Allen project is an example of this.
- The Clean Energy Fund has seed capital for some CHP projects, to be administered by Vt. Department of Public Service.

Challenges

- Interconnecting to the electric grid can be difficult, although Vermont utilities are quite progressive about this. Interconnect costs have come down by about half, compared to five years ago.
- At Burlington Electric, there is one CHP project that generates 10% of their own load. The utility must reserve power for that load if the CHP system goes down, and they therefore justify charging a very high rate for this standby power. High standby rates can challenge the economics of CHP projects.

- If there was a different pool of money to reduce those standby rates, the economy of the projects could improve.
- There should be a financial analysis done for every company before undertaking a CHP project. The length of a project is often about one year.
- Reliability and supportability of the CHP equipment is an issue. Smaller systems may not have as much maintenance support after they're installed. The business that installs the system should maintain it.
- All parts of the state are not on the same page with respect to what is encouraged and with permitting. Companies undertaking CHP projects need to work with PSB, DPS, and ANR, which can be overwhelming for a small business.
- In St. Johnsbury, there is a project to examine the loads of seven manufacturers and perhaps look for a common solution. Vermont companies are lean; many don't want to be in the electric generation business. Maybe utilities should get into co-generation for this reason.
- There is a lot of enthusiasm for CHP projects, but most hit the wall in terms of scale. A collaborative of companies may work, but these can be a challenge.
- Eighty percent of people who initially express interest in a CHP system end up not doing a project because the projects are not economically feasible. There is a quick formula with three data points that Northern Power Systems looks at to initially determine whether a project might be feasible. This and a second, more complex screening is free. A thorough feasibility study for a 2 MW project costs $40,000 - $60,000. All of this is credited toward the project should the customer elect to proceed.
- Usually to make a co-generation project work, companies need to have a continual thermal need, not just a wintertime thermal need.
- For customers who do not want to own the system themselves, they can seek a third party to own and operate the system and in turn, sell them power at a reduce price, typically 10-15%

B. <u>Recommendations</u>

- Use a national standard on interconnections to the electric grid.
- Don't treat small generation as transmission. The state should create a definition of what is a small project, and what is a transmission / distribution system.
- Develop a standard tariff for backup power and standby power.
- Promote community investment, for example with 20-year bonds.
- Create a CHP version of Efficiency Vermont.
- Develop better communications regarding when backup power is needed. An ISO – New England policy change is needed.
- There should be more education around whether CHP is feasible. Education is also needed to counteract the idea that because CHP projects often use fossil fuels, and are "dirty."
- Develop a pooled generation facility discount. With transmission, we only have to pay 5% of a new transmission line; New England pays the rest. There is no similar concept – no discount – for new generation such as CHP.
- Re-examine regulated service territories.

- The state should take leadership in encouraging certain technologies, in order to buy down some of the risks.
- Review and identify legislation that will help standardize and streamline projects.
- Create a pot of funding for feasibility studies.
- Find a way to bridge the financial shortfall for CHP projects. We need gap financing, perhaps using some public money.
- Conversely, some participants thought development money shouldn't fund non-economic projects.
- The state should appoint someone who is not a regulator – perhaps an ombudsman or energy czar – who would coordinate agencies and projects through the process. (Perhaps like a VEDA for energy.)
- Identify and maximize the benefits to the end users.
- The state should provide incentives on the supply side, because we now face a supply-side problem.

C. <u>Priority Recommendations</u>

1. Review and identify legislation to help standardize and streamline projects. Develop a national standard on interconnections to the electric grid. Differentiate between a 'small project' and a transmission/distribution system by providing clear definitions of both.

2. Financial challenges must be addressed through state-supplied incentives, gap financing, perhaps with public money, and community investment.

3. Designate an ombudsman to facilitate projects from start to finish.

3. Community Energy Planning

Facilitator: John Sayles, *Agency of Natural Resources*
Opening Speaker: Deb Sachs, *Alliance for Climate Action*
Scribe: Emily Stebbins, *Stebbins Ink Communications*

Introductory Remarks, *Deb Sachs*

Alliance for Climate Action is a group of state, regional and local government and non-profit professionals with a shared vision of reducing greenhouse gas emissions in Vermont by at least 10 percent by 2010. Communities are in the energy business. They heat buildings, use electricity and operate equipment and fleets for public facilities, including schools. Rising fuel prices, retired energy supply contracts and concern for global climate change provide an impetus for improved energy planning. Title 24, Chapter 117 is a mechanism that enables communities to conduct energy assessments and establish policies for future energy use, conservation and development of renewable energy sources. Both municipal and regional planning entities can development energy goals and objectives. Selected goals might include the efficient use of energy, development and utilization of renewable energy resources, and encouragement of citizen participation at all levels.

The Alliance for Climate Action has developed and implemented some strategies and initiatives that can be implemented at little or no cost. These include a website with household and business emissions calculators for public use, 'mow down pollution'—a mower trade-in program, a vehicle idling campaign, and commuting programs including "Way to Go! Commuter Challenge."

Points of Testimony

A. Opportunities and Challenges

Opportunities

- Entrepreneurial opportunities exist at the local level for economic development for example, HVAC technicians, woodcutters, and inventors may benefit from technical and capital assistance.
- Education is needed at community and regional levels, especially to involve young people. Such education may have been helpful in the Manchester wind project.
- Education is wonderful opportunity because it is a community activity. In the long-term, energy use and generation should be built into the school curriculum. In the short-term, energy use should be fully integrated into school construction, renovation, and expansion projects. Find a local resource for the fuel, and connect to local designers and architects.
- Grass is a potential biomass energy resource. Peacham could heat all of its municipal buildings, including the school with 30 acres of grass. Biomass heating of schools helps students understand where energy comes from.
- Every town has an incredible energy resource in food waste, which creates energy in the biodigestion process. Institutional staff can be trained to separate food for use in a biodigestion plant. Seven tons of food waste in Barre/Montpelier is currently being diverted from landfills.

- Town energy coordinators established under Governor. Kunin are not very active, and could be working with town Conservation Committees. Town energy planning manuals are at least 10 years out of date.
- Communities can help by communicating the impact of behavioral change. For example, burning a gallon of gas uses as much energy as burning a 100-watt light bulb for 15 days.
- Communities can support the leadership capacity of citizens at a local level to influence policy development at the state or national levels.
- A selectboard active in energy planning could help spur community involvement.
- Opportunities may exist in local energy activities that return revenue to the town.
- Identifying the 10 or 15 most passionate people in town and giving them a forum for discussion is productive in providing a channel for communication and participation.
- In Lincoln, an old mill project has been revitalized for both economic development and renewable (hydro) energy generation.
- Grass clippings from people's yards can be used as biomass source.
- The time is right for this work; communities are ready.

Challenges

- Inclusiveness is a challenge: everyone, including low-income people and disenfranchised citizens must be involved.
- Peak Oil is causing and will cause skyrocketing prices. Scenario planning is helpful to understand long-term risk, readiness, and preparation strategies. We also need to understand short-term risks, such as a change in the Saudi Arabian government.
- We must form a cohesive group and present a consistent message to be able communicate effectively and involve everyone. The objective must be clear and measurable over time.
- Projects in the former Soviet Union have been able to recover costs in community efficiency projects within 18 months. In Vermont, a model for returning income from industrial wind projects to the community may help overcome aesthetic objections.
- We could replace 150 million gallons of fuel oil for heating schools with 300,000 acres of grass. What are the land use implications?
- Upfront capital costs are high for many solutions, which require new infrastructure. Behavioral change, however, is cheap.
- It is difficult to obtain renewables at a reasonable price.
- The age of volunteerism is coming to an end. We need to bridge the gaps between the theorists and ordinary people with useful skills. To involve communities, we need to achieve a greater level of community engagement and connection.
- Smaller communities face particular challenges in beginning to deal with energy issues: a small number of people are facing a large number of community issues, each of which requires substantial effort.
- Transportation alternatives to the car are not competitive in most of Vermont. The challenge is to identify alternatives that are acceptable.
- We face ethical and moral challenges in "lies" told by those opposing wind projects. Media and state government could help.

- A sense of emergency and immediacy is needed to get people's attention and action on this issue.
- Putting a human face on the challenge will help with engagement and action.
- We need to change our idea of success from "bigger is better" to "small is beautiful."
- Community leaders face challenges understanding the many facets of the energy picture, and sorting out the data needed to make informed decisions. Access to usable data is needed. A resource will soon exist in a website coming from the VT Sustainable Jobs Fund and VT Environmental Consortium.
- A biomass resource energy analysis should consider food security and food transportation costs.
- Evaluation must be considered: How do we measure our success and progress in terms that everyday people can understand?
- We may be approaching the limit of volunteer capacity in Vermont's communities.
- Regulatory barriers prevent the use of seven former hydro plants. Micro-hydro and micro-wind projects require good net-metering regulations to allow multiple participants to make it cost-effective. The regulatory environment for commercial wind is not constructive. If regulatory barriers were removed, the next hurdle is small-scale investment.

Recommendations

- A "flowchart" and facilitation process is needed to link (1) information and investment resources to (2) project developers/implementers to (3) long-term maintenance and sustainability resources, similar to the resources and hierarchies that exist for affordable housing and economic development.
- Create a comprehensive resource directory to include existing resources, such as the Vermont Superintendents Association for energy audits of school building and Community Action agencies.
- We need not rely on government money—pooling collective community resources (the cooperative model) can have real results. Individuals can make a difference more quickly at the local level.
- The State of Vermont should adopt a resolution to cut oil dependency, or energy use, by a certain percentage within a certain time frame.
- A state task force should study the impacts (economic, environmental) of peak oil on the state, towns, individuals, businesses, etc.
- Update the energy-planning manual for towns and revive town energy coordinators. (VLCT will host conference for town energy coordinators on April 12, 2007.)
- Conduct an inventory and analysis of towns' holdings and their condition (in conjunction with Regional Planning Commissions) to understand duty/replacement cycles and recommend effective investments. The best opportunity to make changes is when equipment has to be replaced or upgraded. Municipalities are now required under General Accounting Standard to inventory infrastructure holdings as depreciable assets, which has created surge of interest in capital planning.
- Conduct town energyshed audits (e.g., grasslands, forestlands, micro-hydro, wind).
- Conduct town audits of commuting behavior, parking/rideshare facilities.

- Provide metrics to measure these activities and their results—invaluable for local planning.
- Market a slogan, such as: "Let's make Vermont carbon-neutral by 2020."
- Form energy committees in each town.
- Public education, community organizing, and citizen engagement are needed. Public awareness and interest in these issues are a result of rising gas prices, so the worst thing that could happen is that prices should fall.
- The issue may not be ignorance or lack of awareness; it may be that people feel that there is nothing they personally can do. Organizing may not be an issue of preaching your message; we need to listen and learn about how others are solving these problems.
- Schools can be a community focal point for education, awareness, and renewable energy projects.
- Encourage denser development patterns as a solution to an aging population and lack of transportation options. Some western states require that houses over a certain size pay into an efficiency utility or program.
- The State should create a framework for towns to have an energy municipality discussion.
- Establish a "LEED" program for towns – metrics, incentives, goals – that expand beyond a single building to communities and regions. Many infrastructure improvements (e.g., HVAC) are invisible, and need to be coupled with awareness, education, and simple progress metrics.
- Volunteer and service learning projects could be conducted around community energy planning.
- Professional development is needed.
- Whatever we do has to be economically feasible. Funding has to come from somewhere.
- Establish a two-tiered education program and support for municipalities:
    - For communities (selectboards, planning commissions) that don't know where to start
    - For communities that have begun projects and want to go to the next level
- Provide technical assistance and capacity-building to existing local entities and boards:
    - Grants, information, case studies, resource directory
    - Small-scale grants for community-level energy planning

C. <u>Priority Recommendations</u>

1. Create a sense of urgency in order to increase public engagement.

2. Provide technical assistance and capacity-building resources to existing local entities and boards
    - Grants, information, case studies, resource directory
    - Small-scale grants for community-level energy planning and implementation

4. Efficiency and Conservation

Facilitator: Dawn Terrill, *Former Secretary of Transportation*
Opening Speaker: Beth Sachs, *VEIC and Efficiency Vermont*
Scribe: Emma Yorra, *Vermont Sustainable Jobs Fund*

Introductory Remarks, *Beth Sachs*

In 1999, the Public Service Board created the nation's first efficiency utility and put it up for auction. It was purchased by the Vermont Energy Investment Corporation (VEIC), which means it will always be owned by the State of Vermont, even if VEIC closes. Efficiency Vermont (EV) is a nationally recognized leader today, and as its budget is increased over the next two and a half years, it will pass California and become the national leader in per capita investment in efficiency.

EV is good at utilizing its resources, but it is still not enough. A challenge is how to realize the potential 30-50% reduction in energy demand. Efficiency needs a broader focus than just electricity; liquid fuels make up two thirds of our total energy use. Efficiency is a bridge that can provide us time to develop sustainable energy sources. It buys us time as we renegotiate our contracts.

There are many issues to consider around efficiency. Should it be voluntary? What are the best incentives? Are penalties and mandates effective? How should efficiency education work? What role do non-public entities play?

Points of Testimony

A. Opportunities and Challenges

Opportunities

- There is opportunity to address rampant institutional waste. The notion that "the best apples have been picked" is wrong: examples include old inefficient sewage treatment plants, and lots of diesel use in trucking garbage across state.
- It is a political reality that to be anti-Efficiency Vermont means being perceived as "anti-efficiency".
- Commercial/industrial sources use about 60% of Vermont's electricity, residential sources about 40%, but residential demand is growing faster.
- Conservation currently is favored over efficiency because credit is given for using less energy, but not for producing double the product with the same energy.
- A mechanism could be devised that funds efficiency investments with achieved efficiency savings.
- Vermont housing stock is very old and inefficient. One opportunity in this area is enlightened banking where mortgages are lower for energy star homes, or energy-oriented home improvements. This is done in Florida and Portland, Oregon.
- Creative metering/pricing have been shown to reduce energy demand in other places. Strategies include tiered pricing, putting energy meters in the kitchen, and use of meters that report usage hourly, rather than monthly.
- Many communities have formed local energy councils that are a good vehicle for information distribution.

Challenges

- There is a perception that efficiency is an unpleasant sacrifice: fluorescent lights make you look green, for example.
- A sense of urgency is missing and energy literacy is low. This is fueled partially by the mindset that there is always going to be cheap energy or a perception of unlimited resources in an era of limited ones.
- There is an unsettled public policy debate on who should own the generation of our power (public/private/centralized/distributed/instate/out of state).
- Uncertainty over future energy prices hinders decision-making.
- Decision-making is not coordinated between individuals and the community.
- There is hypocrisy between what people say and what they do.
- Long-distance transmission has high losses.
- The business community is unsatisfied with Efficiency Vermont and prefers a more market driven approach.
- A barrier facing the implementation of transportation efficiency measures is that it is unclear how comprehensive support should be (simply supporting increased fuel efficiency and carpooling, or extending support to biofuels initiatives for their lower transportation costs, and to smart growth because it lessens need to drive).

B. Recommendations

- Vermont Free Power Plan: Someone purchasing and using a six-pack of CFL light bulbs and would save $50 a year. They cost $8.95 (with in-store discount from EV), and would pay for themselves within 3 months. Everyone could spend their savings on another 6-pack and give it to someone else, with the same conditions. If everyone complies perfectly, within 4 years, every Vermonter will have CFLs.
- A consistent, repetitive education campaign is needed, but questions remain about who will do it, what it will consist of, and how will it be implemented.
- The Department of Public Service or Efficiency Vermont could lead an education campaign and green product suppliers might help.
- A campaign should communicate best practices, especially for business, and list consultants. Public Internet forums on energy could be a component, and local energy committees should certainly be utilized.
- EV's mandate should be expanded beyond simply reducing kilowatt-hours to include transportation and heating.
- Funding for alternatives such as public transportation and Park and Rides should be expanded.
- Efficient, comprehensive alternative funding and delivery mechanisms for efficiency should be encouraged.
- Although it may be difficult to pass, a carbon tax would be effective in increasing transportation efficiency. This could take the form of taxing people on their miles per gallon, rather than gross gallons used.
- When buying a house, the future energy costs of the house should be disclosed. Furthermore, there should be financial incentives to encourage efficient construction and retrofitting.

- Incentives such as tiered rates, more visible meters and hourly metering should be encouraged.

C. <u>Priority Recommendations</u>

1) A public education campaign should be launched that includes best practices and covers all energy areas.

2) Creative funding and incentives for efficiency should be pursued.

3) A long-term (20-year) comprehensive plan for expanding efficiency and conservation's infrastructure in Vermont should be developed.

5. Creating the VT Green Brand Around Energy

Facilitator: Jolinda LaClair, *USDA Rural Development*
Opening Speaker: Andrew Perchlik, *Renewable Energy Vermont*
Scribe: Jacob Blend, *Vermont Energy Investment Corp.*

Introductory Remarks, *Andrew Perchlik*

Could Vermont be the next Silicon Valley of green energy? What steps are needed to achieve this?

To advance the Green Energy Brand, we need to support and coordinate small business clusters, entrepreneurship and creative startups, as well as existing large companies such as IBM and IDX: they are all vital to promotion of this idea. Everyone needs to come together around the idea, to celebrate and highlight successes.

Vermont has many positive attributes that make investment in renewables by venture capitalists possible within the existing infrastructure. Vermont has a good environment, with numerous renewable energy businesses already in existence. The creative economy is a concept many communities are familiar with. There are no other states laying claim to the Green Valley concept.

Vermont can be an incubator for future generations, by supporting the universities that draw and retain the most talented thinkers. Along those lines, Vermonters must make an education beyond secondary school for Vermonters and non-Vermonters alike a primary focus. By nurturing our own and ensuring opportunities exist, we can offset the fact that many young people leave when they grow up. Current problems such as high tuition, a large debt load for graduates, and the exportation of our best and brightest young adults should be addressed.

We must coordinate with the government to maintain the beauty and desirability of Vermont, particularly in avoiding sprawl. The process needs to be one of "organic planning" - synonymous with working the soil and planting seeds – to get us beyond a two-year plan. We can overcome the image of being a poor state. A good place to start is with a current inventory of where the funding is available.

Points of Testimony

A. Opportunities and Challenges

Opportunities

- Vermont has a reputation for marketing a reputable brand of food products. Build on that by marketing green energy in the same way.
- Vermont has a large number of early retirees who want to perpetuate their lifestyle in Vermont. Utilize their knowledge.
- We need to retain those qualities that make Vermont special – natural beauty, farmers, and community.
- This state has a reputation for supporting a creative spirit and entrepreneurship. That could be capitalized on.
- Investment in higher education will provide long-term economic opportunities to the state.

- Diverse technologies are already available. We can provide education around those technologies and provide opportunities for training in renewable energy system installation.
- Startup businesses and entrepreneurs should be nurtured and encouraged. This could be done through financial incentives such as tax credits.
- The Clean Energy fund has over 24 million dollars.
- A good resource is "LEED" – Leadership in Energy and Environmental Design.

Challenges

- We have a free market economy. That means that we are exporting many of our best thinkers and workers between the ages of 25 and 40.
- High in-state tuition, and a very large debt load encourage the best students to leave the state.
- There is no organized public education campaign around green technology. Should we consider integration with the State Department of Marketing?
- It is not clear what kind of funding opportunities are available. It seems like there is a lack of inventive funding options.
- We lack a model for integrating the Vermont name.
- We are an aging state. That leads to a lack of innovative ideas.
- The State lacks a clear strategy to move the 'green brand' forward.

B. Recommendations

- The State of Vermont needs to "walk the talk". Build markets through state purchases of vehicles, fuel, and alternative power contracts that consider future costs.
- Develop a model for a 'Buy Green Energy' campaign, similar to the Buy Local initiative.
- Make Vermont the Green Building State, focusing on landmark buildings such as colleges and universities, state office buildings and the ECHO Center. Actively promote these building to tourists.
- Celebrate success by promoting small-scale windmills on state land and Vermont farms.
- Develop a general public awareness campaign with resource materials that are readily available.
- Provide workforce development and training. Encourage the installation of a program that will lead to Green Building as a professional trade.
- Investments must be made in higher education.
- Provide tax credits and rebates for green buildings.
- Institute a Renewable Energy Fund.
- Evaluate existing surcharges and determine if their scope should be expanded.
- Implement a state slogan "Vermont – The Green Building State". This is something of a double entendre; referring both to physical structures and building the green industry triangle of technology, policy, and finance.

C. Priority Recommendations

1. Education: Increase investments in post-secondary education and workforce training to support the green building industry. Increase public awareness about existing renewable energy technologies and future opportunities.

2. State and municipal governments must demonstrate leadership by buying green, from building materials to vehicles and fuel.

6. Hydro Opportunities

Facilitator: Bill Jordan, *Public Service Board*
Opening Speaker: Mike Scarzello, *Central VT Public Service Corp.*
Scribe: Susan Hayes, *USDA Rural Development*

Opening Remarks, *Mike Scarzello*

The electric power demand in Vermont is about 1100 MW. One hundred hydro facilities owned and operated by Vermont's utilities, municipalities, and independent power producers yield approximately 275 MW of installed capacity. In-state hydropower production provides for approximately 20% of Vermont's annual electric usage. A century ago, 2,000 waterwheels in Vermont were found in 1,200 locations. In 1940, Vermont hydro-powered about 93% of the state's electric demand. Today, Vermont imports about 56% of the power it consumes.

Federal and State permit applications can be a three to five year process, with the difficulty and length of the process proportional to the span of the waterway. The process for a non-functioning dam retrofit is easier than building a new dam in a waterway, and more likely to be approved. Many hydropower sites in Vermont are suitable for expansion: a 1997 Department of Energy study estimates potential generation of about 134MW of power with the expansion of existing dams in Vermont. 2005 Energy Policy Act tax credits are scheduled to end in January 2008.

Points of Testimony

A. Opportunities and Challenges

Opportunities

- There is substantial interest in and potential for micro-hydro. The Hardwick Select Board is supportive of bringing back a second hydro plant; one is currently operating.
- The efficiency of the plants has improved substantially since the use of the cast iron turbines seen in the 1920's.
- A change in existing regulatory processes is needed. Current policies were developed in the 1970's when the biggest consideration was fish vs. cost.
- Aesthetics can be balanced with reduction of greenhouse gas emissions.
- Use pre-existing structures. These structures should be catalogued, and owners contacted to inform them of the potential.
- Identify micro-hydro sites, which require smaller head sites.
- The Quechee, VT operating site has a 400KW generator running at half capacity. It is, however, cost prohibitive to fix in order to increase capacity
- There are great opportunities with this year's rain.
- Publicly available databases show that there is a potential for 134 MW at 151 dams; and 174 MW of environmentally sustainable undeveloped hydropower with existing infrastructure.
- There are greater opportunities for efficiency by redoing what already exists.
- VT Community Hydro is developing in Bennington.

- Assess which dams should be removed, and where it is beneficial to install new ones.
- Running an individual house on hydro power (90 feet of head will generate approximately 400 Watts/day) is not a big opportunity, but may be worth looking into. What kind of permitting is required for individuals?
- In Middlebury, there is interest in redeveloping the Frog Hollow site. A tremendous opportunity exists for the town to light the streets and houses in town with hydropower. This could be done throughout the state, with relatively low impact. We made power in the past, and it should be done again.
- A past site that generated 1 MW, with changes in today's technology, could increase to an output of 4 MW.
- Grants for the Clean Energy Fund specified opportunities for biomass, solar, and wind, but not for hydro. Chances are it will be included next year: encourage the legislature to add it.
- Old Mill dams and those not being used have an adverse aquatic impact and should be removed.
- It is important to look honestly at impacts to aquatic life to minimize harm at new sites.
- In Alaska, there is no federal jurisdiction – only state – for plants less than 5MW. It would be great to see that in Vermont. Federal regulations need to change: this can be seen as both a challenge and an opportunity.

Challenges

- The permitting and licensing process requires a lot of time and money.
- Economic models that rely on weather forecasting don't reflect changes in climates, and are inaccurate and unstable.
- Currently, there is not a reliable method of matching owners of sites with resources.
- Migratory fish passages can present a problem.
- It is difficult to meet water quality standards in Vermont.
- Plant construction presents a high cost at the outset of a project, and the payback is low.
- Permitting difficulties are prohibitive for small projects, and obtaining permits is within reach only for substantial-sized companies or those able to hire a consultant.
- Community education is lacking. The Bellows Falls process would have benefited from objective information. Hydropower advocates need to be trusted and need to be able to get information out.
- Watershed management and bringing stakeholders together for decision-making can be difficult.
- Hydro is often left out of legislation, and is considered a "dirty word" associated with big power companies and bad production in the 1980's.
- There are too many fiscal and regulatory barriers for small operators, inhibiting the ability to move the process along.

B. Recommendations

- Incentives, including moving the sunset provision of the Energy Policy Act further out would be a good first step. Tax credits currently end January of 2008.
- Currently, there is a net metering loss – any credit accumulated during the year is lost after Dec. 31st. A better incentive for smaller producers is to have a different fiscal year (i.e. June – June) or the ability to carry over credit.
- There should be no federal jurisdiction for smaller plants; only state jurisdiction for plants producing less than 5 MW (like Alaska).
- State and federal policies need to change. Laws need to reflect scale, and not all plants should be treated the same. Micro-hydro, for example, should be under local control.
- Make the licensing process economically viable, even for small producers.
- Fast track the state permitting process for Low Impact Hydro Institute certification of environmentally sustainable systems.
- Increase state and federal funding for environmentally sustainable hydro projects.
- Consider financing options such as renewable energy grants and greenhouse emission credits, and incentives such as loans and grants for development and upgrades.
- Petroleum subsidies should be protested and rolled back.
- Establish an entity, such as a centralized state organization, to help with permitting, financing and education.
- Lower permitting fees and study costs. These are currently prohibitive, and applicants can't risk investing large sums into the process, and then be denied. There needs to be a reasonable guarantee of success or more reasonable fees.
- Establish a Task Force to assess the feasibility of 150 sites around the state, and to determine if the estimated potential of 134 MW is accurate. If so, develop a five-year plan to get them up and running.
- A Task Force could undertake additional roles such as:
    - Re-examine regulations
    - Offset projects for those with impacts (e.g. removing old, unused dams,)
    - Weigh the cost/benefit of removing or retrofitting old dams
- Develop a new publication, or update the 1980's publication, that explains rules and regulations, provides a summary of requirements and exemptions, and lists studies, fees, and links to contacts. This would be the key document for developers trying to design systems.
- The greater the incentive, the greater the push to make power. There needs to be a better price for power and elimination of subsidies for fossil fuels.
- Balance on-site and off-site environmental impacts. Avoiding burning coal is an off-site impact.
- Provide education around the local impacts of generation, including damage that is being done. Grassroots support is important.
- Collaborate with organizations like VNRC to showcase projects with minimal impacts.
- It is important to be proactive, rather than oppositional.

C. Priority Recommendations

1. Change federal and state laws to reduce barriers to small hydro. Specifically, on the federal level, add Vermont to Alaska's exemption, under the Federal Power Act, from federal jurisdiction of hydropower projects less than 5 MW. These projects would then only be under the jurisdiction of the State of Vermont. On the state level, change laws or regulations to provide a fast-track permitting process for small hydro projects.

2. Create a Hydro Task Force to provide technical assistance with permitting and financial incentives (or update and maintain a current directory of available financial incentives), and assess the feasibility of the 150 potential hydro sites in various federal and regional studies.

7. Farm Based Methane

Facilitator: Chip Evans, *Human Resources Investment Council*
Opening Speaker: Jeffrey Frost, *AgRefresh*
Scribe: Stephanie Phillips, *Farm Service Agency*

Introductory Remarks, *Jeffrey Frost*

There is a need to increase the number of smaller dairy farms with methane digesters. New technologies in the digester field are now available, such as crop digesters. Three primary topics are discussed in these introductory statements.

1. **Energy Impacts:** A number of farmers use anaerobic digesters to convert methane-generating animal waste into electricity. The anaerobic digesters use bacteria to break down the manure into methane gas. The methane gas is used as a clean-burning, environmentally safe source of fuel for electrical generation. More digesters will equal more power.

2. **Economic Impacts:** A value needs to be placed on the positive benefits of a digester, such as odor reduction, water quality, etc. There are hurdles in implementing digester systems, because the upfront costs are substantial. Up-front financing solutions for farmers would make a big difference. Currently there are grants and banks that fund digesters, however sustainability is a concern.

3. **Environmental Impacts:** Farmers utilizing digesters are eligible for renewable energy credits from the utility company. Green house gas emissions are reduced three times more than what wind projects provide. The methane emitted from digesters is substantially less than the normal amount released. There are technical challenges that need to be addressed, such as how to service the digesters. The cost needs to be considered, with a clear description of ownership models. Finally, there may be public opposition, and the perception that digesters are only being used on large farms.

Points of Testimony

A. Opportunities and Challenges

Opportunities

- There are research projects currently taking place to develop digesters for smaller farms.
- At the present time, there are numerous challenges with manure pumping.
- Electricity will not pay for projects alone; the payback time is too long
- There is a need for systems to be more finite.
- The cost of digesters is very high and grants do not offer enough financial support.
- The cost is about $50,000 for the electric bills on a one thousand-cow farm.
- One person expressed the belief that there is a 50 % failure rate on digesters due to technology problems and the complexity of running them.
- Another individual, however, noted that about 15 digesters similar to the one at the VT Audet Blue Spruce farm have been constructed over the last five years and not one has failed.
- Methane digestion will help to keep Lake Champlain clean.

- Some farms have easier access to 3-phase power than others.

Challenges

- There may be public opposition to large farms.
- The economics are marginal.
- Technology issues exist with the separators.
- Electric companies and their policies for power generation pose problems.
- There is not enough 3-phase power here in Vermont, and costs are too high to bring it to farms.
- The electric infrastructure is inadequate.
- Acceptance of food processing waste may be an issue, and could be constrained by policies.
- There are financing challenges.
- Farmers are reluctant to commit to incomplete technologies.
- Non-renewable grants are risky.
- There is a concern about gas quality – that it may be corrosive.
- Time demands on the farmer need to be considered.
- The size of the farm presents challenges.
- It is essential to discover appropriate ownership models.
- An inability to sell power as CVPS allows is a potential barrier: at some point there will be a cutoff.
- The large number of small utilities makes accepting a farm's power difficult.

B. Recommendations

- Money from EPA should be provided to help support digesters.
- The 2006 Farm Bill should be fully funded.
- Provide incentives from ANR for environmental benefits.
- Cap the maximum 2006 money to cover more farms.
- A feed-in-tariff (or "must take price") for utilities should be established.
- More capital funding needs to be available.
- Designate an 'all-purpose person' with cross agency expertise in permitting to help farmers out.
- Establish an acceptable list of digestible products.
- Develop a regional approach to marketing/production.
- Provide education to farmers about the economics, challenges, and benefits of farm methane.
- Establish a research fund for new technologies and resolution of technical issues.
- Eliminate the 1% cap on net-metering, and develop a tariff for net-metering.
- A resource guide providing contact information on the full scope of farm methane is needed.
- State government should clarify its policy on methane as part of long term energy planning.
- Increase demand by actively marketing farm methane.
- Expand programs like "Cow Power", and guarantee access to a premium power company to all farmers and customers.

- Analyze what it would take to make energy more than a small part of a farm output.
- Transport manure to a regional area.
- Develop a revolving fund, secured by the state, to help farmers invest in more costly technology.
- Dedicate some research funds to high-energy crop based systems.
- Milk prices must be sustainable to keep a digester viable; one relies on the other.
- Ensure broad-based 3-phase access for everyone.
- Promote the CVPS Global Development Fund.

C. <u>Priority Recommendations</u>

1. Fully fund the 2006 Farm Bill, section 9006, and increase the availability of capital funding by creating a revolving fund to help farmers invest in technology.

2. Cost Share Policies: A statewide "must take price" for utilities should be established; eliminate the 1% cap on net-metering; develop a tariff for net-metering; guarantee farmers and customers access to a premium power company; and establish broad-based 3 phase-access for all.

7. Vermont Solar

Facilitator: Hal Cohen, *Central Vermont Community Action Council*
Opening Speaker: Jeff Wolfe, *Global Resource Options*
Scribe: Anita Moore, *USDA Rural Development*

Introductory Remarks, *Jeff Wolfe*

The use of solar power in Vermont has been inhibited by several misconceptions:

1. People think there is not enough sunlight. In fact, all cities and states in the US have more sunlight than Germany and Japan – and both of those countries are world leaders in solar implementation.

2. The belief that solar is too expensive is inaccurate. It is generally affordable, although Vermont lags behind on tax credits and incentives.

3. The idea that the technology is not ready is not true. There are 'on the shelf' solutions that can be provided immediately. Vermont, on a per capita basis, has more certified solar power firms than any other state.

4. There are several kinds of solar power: Solar electric, solar hot water, solar air heating, solar drying, and passive solar heating. Some of these are more cost-effective than others without any state or federal incentives.

Where does Vermont solar fit in? Solar can be part of the energy solution, but larger systems are needed, and this will require incentives. People in Vermont, and in the US in general, are not accustomed to paying for renewable energy upfront. Currently, there are incentives for solar electric and solar hot water systems up to 5KW. These incentives are $1750/KW of installed capacity, plus small federal incentives. There needs to be additional incentives for systems over 5 KW, and for other types of solar energy.

Other steps to increase use of solar power systems include: building passive solar homes with windows facing south, a stepped residential electric tariff with rates that change depending upon how much electricity is used in a month, bonds to fund solar functions in new schools and other public buildings, and a solar thermal collector manufacturing facility in Vermont.

Are there sacrifices required? If we don't make some, they will be made for us. If we are proactive, we can develop solutions and implement changes that work for us. Solar can be and should be an important part of our Vermont energy mix.

Points of Testimony

A. Opportunities and Challenges

Opportunities

- Goals need to be established to help provide a framework for action. VPIRG has published a report that may provide guidelines, and could be a good starting point, but has very low goals for solar utilization.
- Some solar panels are now more efficient and less expensive than in the past. Old panels offered 8% efficiency at a cost of 10/12 dollars per watt; now, they are 14 to 18% efficient at a cost of 5 dollars per watt rating.
- Previously, systems were only for use off the grid. Now systems are mostly used for homes on the grid.

- In Connecticut and New Jersey, where incentives are high, homeowners who are NOT installing solar are losing money. Vermont could adopt similar incentives to encourage homeowners to install solar.
- Solar is a decentralized option, unlike a dam or other type of plant.
- Solar hot water heating could create an amount of energy equivalent to that provided by Vermont Yankee. About 9% of our total energy use in Vermont is for domestic hot water, and 75% of that load could be provided by solar thermal. If a loan program or lease program could be established, this would avoid the high up front costs.
- Be your own power industry. Individual homeowners installing solar can manage their own energy resource.
- There is a tremendous opportunity for jobs. The solar industry is a dynamic, multi-billion dollar industry. It is growing with potential for new career fields and employment opportunities that come with growth in this sector.
- There are substantial tax credits, but many people don't know about them.
- A National Tour of Green Buildings - about 30 houses in VT – is being held on October 7. Information is available at www.nesea.org.

Challenges

- There is a lack of public awareness and a need for education.
    - People are unaware of how solar energy works and is constructed for use in homes.
    - People don't know how to access resources to fund installation costs.
    - There is an inadequate workforce trained for the solar industry.
- Upfront costs are high. Even though the initial cost is recovered over time, it is a large financial commitment.
- There are no financial resources for small businesses or businesses of any size for startup costs to harness solar energy technology.
- Cultural values in the US make it more difficult for people to recognize the long-term benefits of solar technology. Americans are looking for a silver bullet solution to energy problems at low costs. Solar energy takes time to implement due to its decentralized installation.
- There are no incentives for off-grid homeowners and businesses.
- Because of rapidly expanding demand, the poly-silicon supply to the solar industry is currently insufficient, and is not expected to be sufficient until 2008.
- Currently, Vermont has fairly low-cost contracts for electricity, therefore remains impervious to the idea of an energy crisis. The state won't see higher cost until current contracts expire, starting in 2012. Considering the amount of time it takes to permit and build large central power plants, we are already behind and will not have sufficient capacity on line in time. That means we will need to pay whatever the current suppliers want at that time in a supply constrained traditional electrical market.
- Solar power is only one part of the solution. Other resources, such a wind, must also be employed.
- Low-income people are more affected by rising energy costs, as their utility bills represent a larger percentage of their household income.

B. Recommendations

- Provide education around the costs, benefits and opportunities associated with solar power.
- Provide education through Public Service Announcements, similar to those used in the campaign against tobacco and alcohol use by teens.
- Explain that solar power does work in Vermont despite the climate.
- Emphasize the cost savings, security, and safety of using solar power.
- Include a unit on solar power in school curriculums, and develop a course at trade schools to produce 'solar plumbers'.
- Institute a Renewable Energy Resource Center.
- Someone noted that it already exists - www.rerc-vt.org
- Actively promote National Tour of Green buildings and provide model homes to market solar energy and other clean energy resources.
- Legislation is needed at the regional, state, and federal levels.
- Create a Town Energy Coordinator position. This existed in the early 1980's.
- Zoning and permit changes may encourage builders to consider solar energy a more viable option.
- Building Code changes are needed to require the use of solar power.
- Implement a tiered rate system, with tiered costs for power depending on the amount of electricity used in each month. This could start with residential customers.
- All new publicly funded structures, such as schools and municipal buildings, should be required to incorporate all energy efficiency and renewable energy strategies that payoff during the bond period.
- Current energy efficiency requirements for new buildings need stronger enforcement.
- The State should subsidize the wages of solar industry workers by providing tax credits to businesses that are creating jobs in this industry.
- Pass legislation allowing state pension fund investments in solar energy. Solicit the pension funds to provide direct funding, loan guarantees, & low interest loans.
- Funds received for Vermont Yankee for up-grades and dry-cast storage ($2 million per year) should go toward investment in solar technologies.
- Provide incentives for banks to loan money for solar power at a lower rate based on the cost savings derived from the use of solar.

C. Priority Recommendations

1. Educate Vermonters that solar power has a role in meeting our energy needs, and that solar power works in Vermont. Increase training and incentive programs with the goal of changing the culture around solar energy.

2. The Legislature should increase and provide financial incentives that will encourage homeowners to install solar power. Zoning and permit changes should be enacted that make solar power a more viable option for builders and the legislature should establish a tiered rate system, with tiered costs for power depending on the amount of electricity used each month.

8. Transportation and Bio-Fuels

Facilitator: Chuck Ross, *Senator Leahy's Office*
Opening Speaker: Netaka White, *VT Biofuels Association*; Ed Delhagen, *VT Sustainable Jobs Fund*
Scribe: Corey Beach, *University of Vermont*

Introductory Remarks, *Netaka White*

Vermonters consumed 678,972,000 gallons of petroleum in 2002. At that time, transportation accounted for 32% of energy consumption. A number of organizations are involved in considering Vermont's energy future, including the Department of Public Service, the Department of Transportation, Vermont's 25 x 25 alliance, VPIRG, VREC, and Renewable Energy Vermont. Electricity comprises less than half of the energy budget, yet most of the state planning activity is focused on electric demand. What kinds of activities are needed to address the energy demand for transportation and heating?

Existing programs in biofuels include the VSJF's Vermont Biofuels Initiative, biomass (such as pellets used at Shelburne Farms), the Feed and Fuel Network, and the Green Motorcoach program. The demand for biodiesel has risen from 9,000 gallons in 2003 to a projected demand of 1,000,000 gallons in 2006. Other organizations are working in bioheat and off-road fuels.

Alternative transportation is one way of easing demand on fossil fuels. The Local Transportation Facilities Program (LTF), State Rail Plan, car pool programs such as Vermont RideShare and Park and Ride, and commuter buses through the Vermont Public Transit Program all offer alternatives to single passenger cars.

National, international, and regional scenarios ranging from weather disruption, the transformation of large tracts of northern forest in "bio-oil", Northeast energy cooperatives, "end of pipeline", and a variety of government planning options were presented for consideration in thinking about Vermont's energy future.

Points of Testimony

A. Opportunities and Challenges

Opportunities

- The states surrounding Vermont all provide Ethanol-10 services. If Vermont offered E-10 this year, it would increase demand for the fuel by 34 million gallons.
- Biofuel usage is increasing in Vermont. A major opportunity exists for Vermonters to grow the material needed to make these fuels.
- Growing biofuel material would benefit the foresters and farmers of Vermont and open up under-utilized farmland.
- Producing ethanol locally would provide the state with a transportation advantage.
- Now is the time we should be investigating pure vegetable oil, water electrolysis, and hydrogen as ways to power our vehicles.
- An increasing number of Vermonters are running their vehicles from straight vegetable oil. This is a market that should be developed.

- Ethanol is federally controlled, however, biofuels are not, so Vermont should take this opportunity to start organizing around biofuels.
- Ultra low sulfur diesel is another option to consider.
- Regional fuelsheds may be economically possible and more research should be conducted on this concept.

Challenges

- If Vermont decides to produce more corn to make into ethanol, crop acreage will have to increase; otherwise the price of corn will increase dramatically and hurt Vermont dairy farmers.
- There is a concern over the preservation of agricultural heritage, air quality, green house gas emissions, and the affordability of this type of energy. What is important to Vermonters?
- What is the role of the State, and what is the role of the federal government?
- Vermont is a small state, and has a competitive disadvantage in the biofuel production market.
- The price of petroleum will continue to dominate on a world scale for some time, and may influence the price of biofuel.
- The rules and regulations surrounding biofuels are challenging.
- There will always be a concern over the quality, consistency, and cost of alternative fuels.
- Conservation does not seem to be a popular topic of discussion. More time needs to be spent promoting conservation of energy.
- Access to in-state investment capital is difficult.
- There will be a challenge in addressing the requirements of engine warranties in fleet trucks.
- The rail infrastructure needs to improve immensely to make increased use of biofuels viable.

B. Recommendations

- Change the state regulation restricting the purchase of diesel vehicles in Vermont.
- Investigate whether ultra-low sulfur will meet the requirements of the Clean Air Act.
- Begin growing crops for biofuels.
- Start improving the rail infrastructure.
- Create a biofuels template for communities to follow for evaluation, development, and the financial process.
- Examine production models from other areas.
- Begin a Vermont Brand marketing program for biofuels.
- Create tax incentives for growing, producing, selling, and using biofuels.
- Appropriate $1 million from the Clean Energy Development Fund with $500,000 for a farm viability biofuel grant program.
- Increase education programs on biofuels.
- Create a state biofuels website.
- Work with UVM Extension to develop pilot projects around the state.

- Provide financing to private sector fuel dealers to sell biofuels. A low cost loan program through the state would bolster fuel dealers' infrastructure.
- Explore the economic feasibility of in-state production of biofuels.
- A transportation efficiency model based on the Efficiency Vermont program should be developed.

C. <u>Priority Recommendations</u>

1. Require a '2-5-10'-fuel standard by 2008 (2% biodiesel in on-road fuel, 5% biodiesel in off-road and heating fuel and 10% ethanol in gasoline).

2. Conduct up to 10 pilot projects around the state to demonstrate the economic viability of in-state biofuel production, and establish investment data for farm scale, local scale, or commercial scale operations. The Clean Energy Fund and the Pension Fund could fund these pilot projects.

3. Create an efficiency utility for liquid and transportation fuels. Include conservation strategies.

9. Waste to Power

Facilitator: Rich Smith, *Department of Public Service*
Opening Speaker: John Schwalbe, *Casella Waste Systems*
Scribe: Mary Mankin, *University of Vermont*

Introductory Remarks, *John Schwalbe*

It used to be that everything went to the town dump and disappeared there. We now have Landfill Solid Waste Facilities. There has been a recent evolution of not looking at waste as going somewhere to remain hidden, but considering how to convert that waste back into energy. Through a series of reactions we call decomposition, we get a gas that is roughly half the BTU value of natural gas. There are other constituents in it – carbon dioxide, and non-methane organics. For scale, every million tons of solid waste has the potential to create .8 MW of electricity. Landfills are the largest human made source of methane in the US.

The technology is in place already; greatly simplified, the landfill is a high-tech bathtub. The landfill is lined across the bottom, which collects water. That collected water is leachate. As the landfill space is filled, a series of perforated pipes are inserted, and the decomposing gases, typically a source of landfill odor, are extracted. That gas is cooled, impurities are removed, and then the gas is used as a fuel to turn combustion engines and generate electricity, which would be available for a direct use application or sent to the grid.

Organic materials have a high methane generation potential. Other waste ends up in landfills, such as paper products and plastic. Even in Chittenden County, organics and recyclables end up in garbage. It is an education issue.

Points of Testimony

A. Opportunities and Challenges

Opportunities

- A landfill may be tapped to extract gas and generate renewable energy– it is basically a compost pile that has not been nurtured.
- About 75% of waste stream can be converted to power through different technologies.
- With the increased price of electricity, conversion of waste to power becomes an appealing and viable option.
- The European Union provides a good model for garbage processing – tighter restrictions on what can go into a landfill, and new technologies for processing.
- People are starting to see solid waste as more than just garbage.
- Changing the language from “waste” to “residuals”, “resources” or “biosolids” would encourage people to view the process more positively.
- It may be possible to set up some of the smaller, closed sites, with a renewable energy operation.
- There is an opportunity for producers of micro turbines and gasification equipment to develop scaleable size systems for waste to energy conversion.

- Manufacturers, such as those in the lumber business, for the most part know their products and wastes well.
- It's a matter of cost; it must be economically advantageous to deal with waste.
- In Chittenden County, a subsidy is paid to get rid of waste wood to burn at the McNeil Power Plant.
- There is an opportunity to look at waste as a community commodity, rather than paying to have it shipped away.
- Waste is really a resource out of place.
- One critical factor is to capture waste as close to the source as possible. Much of the cost of waste disposal is transportation.
- The private sector has taken over recycling because it is a moneymaker.
- Vermont has only two major landfills, however opportunities may exist at smaller ones.

Challenges

- Not every small landfill can make money by producing electricity. The mining of small landfills has historically not been economically feasible.
- It has been a struggle in Coventry to get to the right price point based on current electric rates and the cost of operating the facility.
- There are permitting and perception obstacles to overcome.
- Plastic bags are in the wrong place in the landfill.
- There are no uninvolved third parties who can explain the science and engineering to the public. Everyone seems to have a hidden agenda. Universities may be the best impartial educators.
- There is no regulatory framework for requiring manufacturers to make things that can be recycled, or to prohibit the manufacture of non-recyclables.
- There is already an infrastructure of inventorying waste, however the information is not being aggregated.
- We don't seem to have a very robust collaborative network where we can use innovation to solve problems with people from different sectors.
- The State is not involved enough as a facilitator; it is working on a small scale.
- People need to be educated on the value of the waste stream. Look at the waste generated here at lunch today.
- Residential hazardous waste products are too small to regulate, but are extremely toxic in bulk waste management.
- There are permitting challenges, especially for small operators.

B. Recommendations

- Some kinds of plastic can't be recycled. The US should use just one type of plastic and recycle it all.
- There should be regulatory frameworks to make manufacturers responsible for the recycling or treatment of products they produce.
- Put the economic waste burden on manufacturers.
- There needs to be a national tax because of conflicts with different states.
- First, we need an inventory of what is out there, in terms of energy value, and environmental impact. We also need to know the composition of the waste stream.

- The government needs to commit to long-term energy credits.
- Our real incentive for dealing with waste is not the BTUs produces – it is the reduction of cost of the waste stream.
- Conversely, someone asserted that the primary motivation in any waste conversion technology is the generation of power.
- The State needs to act as a facilitator and educator in attaining and understanding new technologies.
- We need to engage policy makers, especially at the regional level.
- Education is needed. Make recycling part of the curriculum at schools.
- Streamline the permit process, and create a more robust review of the RDD rule for the evaluation of emerging technologies.
- Eliminate conflicting environmental regulations.
- Explore the viability of creating smaller, more localized processing centers.

C. Priority Recommendations

1. Inventory available technologies and waste material available that can be converted to power, and assess economic incentives to expand viability.

2. The State should act as a facilitator and educator in collaborative efforts that will position the people of Vermont to adapt to new technologies.

Wind Power – Community/Household/Business

Facilitator: Paul Costello, *VT Council on Rural Development*
Opening Speaker: Lawrence Mott, *Earth Turbines*
Scribe: Alyssa Jumars, *Middlebury College*

Introductory Remarks, *Lawrence Mott*

Wind Power is the kinetic energy of wind that is turned into a useful purpose.

Resource: The power that can be obtained from wind is a cubic function of the wind's speed, so the viability of a wind project depends upon the availability of wind speeds above a certain threshold. For most commercial wind projects, the threshold necessary to make a project feasible, given current technology, is a wind speed of 16mph or greater. In general, the only locations in Vermont where the wind surpasses this basic threshold – where the wind "resource" is sufficient – are along the ridgelines between two and three thousand feet in elevation.

Scale: Wind power applications range broadly from (1) residential/small business installations, to (2) community-scale installations, to (3) utility-scale installations.

1) The ***residential/small business sector*** has not really progressed since the 1970s. There are currently 20 or so small companies that haven't gone much of anywhere. But the potential is still there.

Net Metering allows residential/small business consumers to install a wind turbine (or a solar panel) and remain connected to the grid, allowing them to pull power from the grid when necessary and to feed excess electricity into the grid in return for a type of electricity credit. One question in debate is whether utilities should have to pay home owners for excess electricity generated – as it stands, home-owners can only get electricity "credits" from the utility which expire after 12 months.

Incentives: 10 states offer homeowner incentives for the installation of residential renewable-energy systems. Vermont has a very rich program for homeowner incentives.

2) ***Community wind power*** is based on cooperative business models: community groups collaborate to build utility-scale or smaller wind projects. These groups can often obtain investments or land from the municipality and thereby lower some of the typical, initial capital costs of wind projects. Examples of this approach are abundant in Europe, particularly Denmark. However, the Midwest has also seen an explosion of renewable-energy cooperatives. Unfortunately, we probably won't ever be able to satisfy all of Vermont's electricity demands with this model.

3) For a ***utility-scale commercial project*** to be economically feasible, there must be an abundant wind resource.

Inefficiency of Transmission: Because the location of the wind resource and the location where the electricity is ultimately used are often far apart, substantial energy is lost in the transmission system.

Technology: The technology we currently have may not be perfect, but our efforts would be best spent applying the technologies we *already* have rather than waiting for a "breakthrough." For example, instead of waiting for a low-speed turbine to finally come around, we should erect currently available turbines where there are appropriate wind resources.

In sum, important topics for wind power are ***resource and location, scale,*** **and the *Vermont context***. Important questions to ask are what are the opportunities for

utility-scale wind, what are the opportunities for community wind, and how many turbines do we want to see in our backyards connected to the grid? There is currently a lot of interest and excitement in Vermont over wind.

Points of Testimony

A. Opportunities and Challenges

Opportunities

- There is a current groundswell of public interest and broad support for wind.
- There are emerging examples of public-private partnerships within communities to promote local power generation.
- Community groups are currently working to develop collaborative responses to local energy needs. These groups, such as the Addison County Relocalization Network (ACoRN), are looking to bridge back-yard wind, and large corporate wind farms by working collaboratively on small-to-medium scale projects.
- Successful models are found in community-supported wind in the United States, particularly in Massachusetts, Minnesota, and Wisconsin.
- Vermont has a lot of local expertise – for example, Northern Power and NRG. How do we take better advantage of this intellectual capital?
- There is great opportunity to work with local artists to make the cold, grey structures of wind turbines beautiful and attractive, especially to tourists.
- The Public Service Board is considering expansion of net-metering size, whether to allow "group" net-metering, and whether to allow off-site community net-metering. These decisions could potentially open up opportunities for community energy projects in Vermont.
- Subsidies are readily available for home and small-business owners to install wind/solar systems in Vermont.
- Wind technologies are rapidly improving; Vermont could potentially become a "laboratory" for the research and development of further technologies.

Challenges

- The regulatory process is cumbersome, expensive, and uncertain.
- The permitting process is prohibitively expensive for community groups. The process is not designed to encourage local, community-owned wind projects.
- Vermont laws and regulations inhibit cooperative ownership structures that could encourage the type of growth in wind power that has occurred in Europe.
- Bureaucratic and regulatory hurdles impact public involvement in wind projects.
- The NIMBY attitude is prevalent at both the municipal and property-owner level.
- Local political disagreement over the economic, environmental, and aesthetic impact of wind is impeding the development of wind power in Vermont.
- Wind has become a very emotional issue for Vermonters; emotions override reason in local and regional decision-making processes.
- Preserving Vermont's ridgelines has become a central sticking point in the discussion of wind in Vermont.
- Unfortunately, the current wind technology is really only appropriate for locations where the wind speed is 16mph or greater. In Vermont, such wind resources are

typically located between two and three thousand feet- in other words, primarily along the ridgelines.

- Wind opponents are particularly vocal.
- The editorial board of the Burlington Free Press has been shaping public opinion in opposition to wind.
- Questionable statistics about "public opinion" are often used in arguments against wind in Vermont as a whole. On a local level, "public opinion" clearly depends on the particular project. Sweeping statements about Vermonters' support, or lack of support, for wind are meaningless.
- Education of youth does not encourage awareness of energy issues.
- Debates on wind in Vermont are generally shallow because of a lack of basic technical understanding on the part of the public.
- The general public does not understand the magnitude of the energy shortage Vermont is facing.
- There are a number of misconceptions about wind and its economic feasibility.
- There is a lack of real-time pricing indicators in VT that allow consumers to know exactly what they are paying for electricity at a given moment.
- Because the outcome for any given wind project in the regulatory/permitting process is highly uncertain, it is tremendously difficult to attract investments.
- Vermont lacks capital and infrastructure for wind. Capital is flowing to more "welcoming regions" in the country.
- Renewable-energy incentives are only for small installations.
- For small installers of renewable-energy systems, the cost of insurance is a large barrier.
- Subsidies for traditional sources of energy put wind power at a disadvantage. The artificially low prices of other sources, which tend to have high external costs, pose a major question of priorities and leadership.
- There is a basic lack of understanding of wind's environmental and aesthetic impacts relative to traditional sources of power. These sources do not suffer from the same level of scrutiny as wind. (There should be bird and bats studies for traditional sources of energy, for example.)
- There does not seem to be any clear or thoughtful plan for how Vermont is going to resolve its future energy shortage.
- The current transmission system is a barrier to wind in Vermont.
- There is a basic lack of infrastructure for wind, because the location where the wind resource is the greatest is generally not where the power is consumed.

B. <u>Recommendations</u>

- Encourage more active planning for wind across Vermont by identifying areas of prime resource and minimal environmental impact.
- Enforce the IRP (Integrated Resource Planning) that is technically on the Vermont books, but which has not been carried through.
- Establish clearer guidelines so developers know that if they comply with the necessary guidelines, the outcome of the regulatory process will not be so uncertain.

- Streamline the permitting process. Determine whether all scales of projects will have to follow the same regulatory steps. Preferably, establish different, but clear guidelines for smaller/community-scale projects than for commercial/utility-scale projects.
- Have the State identify which sites are appropriate or inappropriate for wind development, so the burden of proof does not fall so heavily on the applicants for CPGs.
- Use federal and state money to help fund some of the impact studies that are often prohibitively expensive for developers and community groups.
- Have the DPS engage with AWEA and ANR to create a database for bird and bat information in Vermont so applicants for project permits don't need to conduct redundant impact studies at their own expense.
- Appoint more than 3 reviewers to wind projects under review by the PSB.
- Make group net metering possible.
- Mandate common interconnection standards among all Vermont utilities.
- Allow grid-tied home/business owners to sell excess electricity back to utilities at net avoided cost. This would encourage more people to install small renewable-energy systems, thereby helping to alleviate Vermont's energy shortage and fueling the local economy.
- Initiate a participatory process to find a balance between consumer-producer and utility needs.
- Define "Vermont scale" and what it means for wind power.
- Vermont needs strong, positive gubernatorial leadership to promote and achieve renewable energy use, and to define Vermont scale.
- Encourage the Governor to give an annual "state of the state" address that focuses on where we stand in terms of energy demand and supply.
- Encourage state policy that promotes community-scale projects.
- Develop a template for community-scale projects in Vermont.
- State leaders should tour wind sites across Vermont.
- Level the playing field among non-renewables and wind by thoroughly evaluating externalities and the life cycles of every project.
- Outreach to the public: get out into communities and talk to people unpretentiously about wind issues.
- Make renewable energy a component of K-12 school curriculum.
- Make "impact studies" part of an academic exercise for college and high-school students. This would both provide an educational experience for Vermont's students and help reduce the cost to developers and community groups.
- Develop a program at VT Technical College for renewable-energy startups.
- Get art involved in the process of educating the public and improving public opinion towards wind.
- Encourage partnerships between wind companies and communities. Identify communities that want projects.
- Create a network of support among proponents of wind in order to better organize the wind movement in VT.
- Encourage each county to be responsible for producing its own power .

C. Priority Recommendations

1. Realizing the economic development potential of wind generation at all levels in Vermont will require Gubernatorial leadership in defining the appropriate scale for Vermont, building state plans to promote possible developments, coordinating regulatory review, and evaluating the potential for incentives in line with Vermont goals.

2. Public Education around energy issues will be crucial to Vermont's long-term economic viability. Renewable energy education, founded on teaching about the global challenge presented by climate change, should be included in Vermont curriculums including elementary, high school and college. State colleges should build curricular offerings to make Vermont a leader in advancing a broad array of renewable and clean energy generation.

IV. Conclusions

When morning panelists were asked about the threat of global climate change, and whether it added urgency to the development of in-state clean power and fuels sources, all agreed and pointed out that the subject of the Local Power conference was critically important for the future of Vermont. Governor Douglas reinforced this tone, and affirmed that global climate change was real and must be addressed by concerted action. Senator Leahy's argument that 'business as usual' was not enough, added additional intensity to the work of the day. Participants throughout the day presented their ideas, debated, and wrestled with the vexing challenges ahead with passion and dedication to working for the progress of Vermont.

The conference brought diverse participants together; inevitably, a variety of viewpoints contended in each working group as members put their ideas on the table. Despite the great variety of approaches and contradictory positions expressed (and listed in the bulleted recommendations in this report), several key themes seemed to unite all speakers and work group participants:

As Vermonters, we want to do what is in our power today, and to fulfill our responsibility to the future.

Vermonters share a patriotism which is closely tied to the natural resource economy, to support for Vermont businesses and communities, and to in-state energy generation, fuel development, and efficiency.

Participants in a variety of working groups pointed to the need for public information and education about conservation and efficiency, the multiplier effects of in-state energy and fuel development, and the hidden costs and externalities of various energy sources. Vermont's energy future is a paramount public interest.

Despite differences of approach, participants recognize the imperatives presented by global climate change and international energy competition, and look to a future of innovation and opportunity in Vermont's energy, fuel, and efficiency development.

Participants see opportunities for businesses that can make energy, develop fuels, and creatively advance new market-place opportunities. They believe that Vermont can develop in-state sources to substitute for some energy imports, and that we have the intellectual capital to build businesses that can export their creative problem solving with energy solutions far beyond the borders of the state.

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Clearly, while unprecedented work is proceeding at the state and federal level, in the business community, and in towns throughout Vermont, there is much still to be done.

This report documents an exciting and provocative list of recommendations and ideas on how to stimulate economic opportunity in the energy sector in Vermont. Readers will

note duplications and contradictions and may perceive errors in the text. This report is not designed to serve as a final analysis or strategic plan, but rather as a stimulating set of ideas for further digestion, articulation, and consideration. As reporter, VCRD does not censor the content of deliberations, and is cautious about proposing synthetic consolidations of the diverse ideas expressed. Instead, we report the results of the Local Power discussion and recommend their review to the administration of Governor Douglas, Vermont's Congressional Delegation, federal partners, non-profit supporters and advocates, entrepreneurs and investors, and the people of the state.

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It is important to recognize that the results of the Summit will directly feed the further strategic evaluation of in-state energy opportunities in Vermont through the **Vermont Rural Energy Council (VREC)**. In July 2006, the Vermont Council on Rural Development instituted VREC to unite federal, state, non-profit, and industry leaders in identifying opportunities and proposing policies, investment strategies, and practical action to expand economic development in renewable energy generation, fuel development, and energy efficiency in rural Vermont (VREC's charge and membership are available at www.vtrural.org). VCRD built VREC based on the premise that rural energy generation—and leadership in developing the systems to expand it—is a key to the success of Vermont's economic brand and critical to the development of a more energy independent and innovative economy that will attract and retain young entrepreneurs and families. If Vermont leads in energy efficiency and the innovation of renewable, local power, the state can build a major competitive advantage for its businesses and communities.

The Vermont Rural Energy Council (VREC) is charged to evaluate issues and build a practical blueprint for action to promote energy generation in rural Vermont. VREC will explore opportunities provided by Vermont's forest, farm, solar, wind, water and thermal resources to maximize innovation and the sustainable use of Vermont's natural resources in energy generation. The Council will address opportunities to expand the generation of electric power but will consider transportation and home and commercial heating of equal importance. VREC is not designed to address the wide range of issues related to Vermont's energy policy or to develop recommendations around the future of Hydro Quebec contracts, Vermont Yankee re-licensing, or utility-scale wind projects. Instead, at the conclusion of its work in mid-2007, VREC will make specific recommendations to Vermont's Governor, Legislature, Congressional Delegation, energy industry and public designed to expand state policy and public/private cooperative action to support and enhance the generation of power, development of fuels, and improvement of energy efficiency in rural Vermont.

V. Acknowledgements

VCRD deeply appreciates the sponsorship support of the 2006 "Local Power" rural energy conference by many of Vermont's key leaders in energy development and distribution and other partners in Vermont's rural development:

Central Vermont Public Service Corporation
Citizens Bank
The Farm Service Agency
Green Mountain Power
NRG Systems
VELCO: VT Electric Power Company
Vermont Public Power Supply Authority
Vermont Electric Cooperative
The Vermont Fuel Dealers Association
Vermont Housing Conservation Board
Washington Electric Cooperative
Yankee Farm Credit

The Council is especially grateful for the leadership, support, and partnership of **Governor Douglas and his administration** in the Rural Summit and in all our efforts.

VCRD also appreciates the key leadership roles of **USDA RD**, the **Vermont Community Foundation,** and **Vermont's Congressional Offices** in supporting our efforts in service to rural communities.

VCRD is grateful to the speakers for the Local Power Conference including **Governor James Douglas, Senator Patrick Leahy, Daniel Reicher, and Lieutenant Governor Brian Dubie**. Their presentations provided inspiration, challenge, and thoughtful analysis of the opportunities ahead.

Thanks also need to go to the **VCRD Summit Committee** for leadership in planning this event: **Barb Grimes, Bob Ackland, Dawn Terrill, Jolinda LaClair, Steve Kerr, Brian Keefe, Chuck Ross, Jonathan Wood, Steve Patterson, and Jenny Nelson.**

The Local Power roundtable was produced with the support of over 40 **presenters, facilitators, scribes, and panelists**—all of whom donated their time. They are listed in each section of the proceedings. Their contributions made for an informed, efficient, and fair 'marketplace of ideas,' and we appreciate each of their efforts.

Bonnie Smoren directed the logistics of the day with characteristic grace and efficiency, and **Brenda Hausauer** provided indispensable organization supporting the day.

The conference will provide ideas to be considered by the strategic planning process of the **Vermont Rural Energy Council** (VREC). See the VCRD website at www.vtrural.org for the VREC charge, membership list, and more information. VCRD

appreciates the participation of VREC members in the conference, and especially the leadership role of chair **Richard White** of Community National Bank.

Finally, the council is grateful to for the on-going leadership of **entrepreneurs, farmers, state and federal officials, non-profit leaders, utilities, and the diverse partners** throughout the state working to develop in-state power sources, fuels, and efficiency. Thanks to all participants for putting your leadership on the line at this conference, and for all that you do to promote energy development and the prosperity and sustainability of Vermont's rural communities.

Appendix

Edgar May
Recipient of the VCRD 2006 Community Leadership Award

Edgar May of Springfield, Vermont was selected to receive VCRD's 2006 Community Leadership Award. The award is given annually to an individual who exemplifies the transformative capacity of community leadership.

Edgar May, a Pulitzer Prize winning journalist, has been deeply committed to serving the state of Vermont and his community of Springfield. After a full career in journalism and national leadership in the Peace Corp and Vista program, Mr. May became a leader in the Vermont State Senate, where he acted as chairman of the Appropriations Committee before he retired in 1991. Altogether, he served 16 years in the State House, including 8 years in the House of Representatives where he was chairman of the Committee on Health and Welfare. A respected statesman, he has served on numerous boards including the Vermont Symphony Orchestra, the Vermont Student Assistance Corporation, and as a trustee of the University of Vermont.

Most recently, Mr. May has been the visionary force behind the Southern Vermont Recreation Center in Springfield, mobilizing, fundraising, and leading volunteer efforts to transform the neglected and abandoned Foundry Building into a vibrant community asset. His leadership has inspired a group of more than 150 individuals to become active volunteers in a project that will provide a space for heath, recreation, and community gatherings in an affordable public facility that will serve as gateway to Springfield.

The Vermont Council on Rural Development is pleased to recognize Edgar May's dedication, integrity, and service to rural Vermont with the 2006 Community Leadership Award.

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