



WORKING TO MAKE DAMARISCOTTA AN ALTERNATIVE ENERGY CENTER AND CREATING WELL PAYING JOBS IN THE PROCESS

(NOTES BY PAUL KANDO)

Three years ago WalMart set out to build a mega-store in Damariscotta. Citizens and local merchants, organized by two exceptional young women, sprung into action, forcing the town to hold a special referendum at which an ordinance limiting retail development to a much smaller square footage than WalMart required was overwhelmingly approved.

The Downtown and its businesses were saved. However, the campaign that led up to the vote has divided the town. After the victory celebration at a local restaurant, some of us felt the need to reach out to the losing side. A couple of meetings with their leaders followed, during which we probed the reasons why people like a WalMart store, even though it clearly destroys much, if not all, of the local economy. The issues revealed were strictly monetary ones: “taxes are too high and WalMart would be a major taxpayer to the town”; “can’t afford to shop anywhere else; WalMart is a discount store”; “WalMart would create local jobs”, “with high gas prices, I can’t afford to drive to the Rockland or Augusta Wal-Mart”, etc. The common denominator: people who want a local WalMart do not earn enough money because there are few well paying local jobs to be had. And well paying jobs are lacking because the area’s economy is based almost exclusively on tourist services and retail, rather than production, i.e. value adding, businesses.

The Midcost Green Collaborative (a project of Community Building Trust, a local nonprofit) was formed by a group of local citizens to remedy this situation. We observed that global warming and consequent climate change were becoming recognized around the world as a crisis demanding attention and action. And we observed that a number of nations (alas not the United States government) recognize this growing public awareness and are willing to treat it as a business opportunity, particularly in the area of renewable, alternative energy products and services.

Our intention, therefore, is to put the Damariscotta area on the map as Maine’s premier renewable energy center, where businesses offering alternative energy products and services flourish and grow, providing a whole array of well paying jobs to area residents. Furthermore, because renewable energy is usually local in both origin and use, the jobs created will not be easily outsourced to distant lands.

Our first project was to establish a Sustainable Energy Fair as a local annual event. The first “Expo” took place just before Earth day 2007 and was, by all accounts, a well attended success, featuring over 40 exhibitors and a number of educational programs. Expo 2008 will be held on April 18 & 19, again just before Earth Day in the Damariscotta YMCA.

We are also aware that the nine states that comprise the Northeast United States (including all of New England) are huge emitters of harmful greenhouse gases. In fact, if these nine states were a country, our region would be the seventh largest emitter on the globe, after only the U.S., China, Russia, Japan, India and Germany (1). The main reason for this dubious distinction is found in our energy use patterns. Looked at by sector, here is how the Northeast stacks up in energy consumption (mostly fossil fuels) against the rest of the world :

	<u>Northeast</u>	<u>Global</u>
Industry	13%	14%
Electric power generation	30%	24%
Buildings (residential & commercial)	22%	8%
Transportation	35%	14%

These percentages (global figures do not show the large emissions originating in agriculture, forest destruction and land use issues) show a disproportionately high relative regional energy consumption for power generation (mostly by means of aging fossil fueled plants located away from communities, having an average efficiency of only 33% -- the rest is low grade heat going to waste -- and a power grid which loses an additional 10-20% in transmission losses); our buildings (comparatively very inefficient – the typical New England home uses, square foot by square foot, more than twice the energy of a European one); and transportation (our means of getting around is almost exclusively the automobile) (2) (3)

To be effective in reducing both our greenhouse gas emissions and our energy costs, we must focus on these three major sectors. Therefore we plan to demonstrate cost effective energy alternatives in all three areas. Each represents an area of significant economic opportunity for our region. In each our guiding principle must be common sense: First eliminate all (energy) waste. Second, take advantage of all “free” energy sources found in the location. And third, employ alternative energy technologies only to supply the energy requirements that still remain, minimizing the size and cost of any renewable energy system and maximizing its efficiency.

ELECTRIC POWER GENERATION: FEED-IN TARIIFS

Our primary focus here is not a technical, but a policy initiative, based on observing some highly successful models.

A feed-in tariff is what a public utility is required to pay a distributed generator (e.g. a home or business with a photovoltaic array or a wind-driven generator) for power fed into the power grid. (Currently such power generators get credit against their own electric bills, limited to a maximum equal to the cost of all energy purchased from the grid. This simply never involves any cash payment to the distributed generator, who actually suffers a financial paper-loss if he produces more power than he can get credit for.)

A feed-in tariff is set by law, usually high enough to encourage remote (distributed) power generation using a specific technology (such as photovoltaics). Most feed-in tariffs are set to be in force for a number of years (usually 15 or more) and are reviewed and revised as necessary.

Feed-in tariffs encourage investment in renewable energy technologies by providing a predictable payback during the early phase of market development.. Thus they promote economic development and job creation. They also reduce the relative cost of the renewable energy component of energy efficient/ zero energy buildings, aiding the development of a renewable energy market and encouraging highly energy efficient building practices by lowering their relative cost.

Over 40 nations, and the Canadian province of Ontario, currently have feed-in tariffs. They often vary in their details, such as the level of payment, years of duration, periodic reviews, inflation-adjustments, etc. The most successful feed-in tariff has been enacted in 2003 by Germany, which since has seen its photovoltaics industry grow six-fold, becoming the world leader. Many European nations have feed-in tariffs and, based in their experience, the European Union is on the verge of recommending a union-wide tariff for all members to adopt. Asian nations with feed-in tariffs include another world leader, Japan.

To date no U.S. jurisdiction has adopted a feed-in tariff but several states are considering such legislation. We feel a feed-in tariff will be a significant economic development tool for Maine. (4)

PASSIVHAUS: DEMONSTRATING ENERGY EFFICIENCY IN NEW HOUSING

We plan to demonstrate the viability of constructing new houses (and other buildings) that require no space heating system in our climate. We will construct a house of conventional New England design in the Damariscotta area. The intent is to make it available for the public to see and provide its plans to those interested at the cost of reproduction. The house will be constructed to meet the German Passivhaus (5) standard, currently the most demanding in the world.

The principle, first eliminate all energy waste, second, take use the energy resources found in the location, third, employ alternative energy technologies only to supply the energy requirements that still remain, is exemplified by Passivhaus, a voluntary building performance standard developed over several years by Bo Adamson of Sweden and Wolfgang Feist of Germany. In spite of its name, the standard is not limited to houses; it applies to any building. The result is an ultra-low energy building that requires little energy for space heating.

Unlike American building standards, a key feature of Passivhaus is that it specifies performance rather than prescribe specific solutions. Therefore it encourages innovation rather than discouraging it. A passivhaus building must meet or exceed the following energy performance requirements:

The building must not use more than 15 kWh/m²/year (4755 Btu/ft²/yr) in heating energy. This must be achieved without an increase in energy consumption somewhere else, e.g. burning more lights or using appliances that waste more heat, etc.

The heat load at design temperature must be less than 10 W/m²/hour

With the building depressurized to 50 Pascals below atmospheric pressure by a blower door, the building must not leak more air than 0.6 times the house volume per hour.

Total primary combined energy consumption for heating, cooling, water heating and electricity for all other uses must not exceed 120 kWh/m²/year

These standards are much higher than normal building codes. In the United States, for example, a Passivhaus will require only 1 Btu per sq. ft. per degree day, compared to 5 to 15 Btu per sq. ft. per degree day for a similar building built to the 2003 Model Energy Efficiency Code. This is between 75 and 95% less energy for space heating and cooling than current new buildings that meet U.S. building energy codes.

Buildings that meet the Passivhaus standard are able to dispense with conventional heating systems. However, this does not mean that no heating is required and Passivhaus buildings do include a small auxiliary heating element, usually as part of the central ventilation system required to maintain air quality.

Experience has shown that such buildings can be built for approximately the same cost as ordinary buildings anywhere below the 60th parallel (above which extra costs are incurred. (We are near the 44th parallel)

To date, a combination of the following basic features have distinguished Passivhaus construction:

- Compact form and good insulation ($U=0.15 \text{ W/m}^2\text{K}$; $0.026 \text{ Btu/h/ft}^2/^\circ\text{F}$) – *A New England Cape is an ideal form for such a building.*
- Southern orientation and proper summer shading (passive use of solar energy is a significant factor)
- Energy efficient windows (Not exceeding $U=0.80 \text{ W/m}^2\text{K}$; $0.14 \text{ Btu/h/ft}^2/^\circ\text{F}$)
- Airtight building envelope (total leakage not to exceed 0.6 times the house volume per hour)
- Passive preheating of fresh air (through underground ducts that exchange heat with the soil. Even in cold winter days this will preheat fresh air to above 41°F (5°C))

- Highly efficient heat recovery from exhaust air using an air to air heat exchanger (>80% heat recovery rate)
- Hot water supply using regenerative heat sources, such as solar heat and/or heat pumps running on solar power
- Energy saving household appliances and lighting (low energy refrigerators, stoves, freezers, lamps, washers, dryers, etc.)

(FMI: <http://www.passivehouse.com/English/PassiveH.htm>)

ENERGY AUDITS: THE KEY TO COST-EFFECTIVE ENERGY IMPROVEMENTS IN EXISTING HOUSES

The MGC has applied for and received a Maine Community Foundation grant for the purpose of acquiring the necessary instrumentation and software for professional energy audits. The use of this equipment will be shared by our members who are Maine State certified residential energy auditors. The audits will be offered at discounted rates to area homeowners, in collaboration with such membership associations as the Damariscotta River Association, the Pemaquid Watershed Association, and the Sheepscot Valley Conservation Association. The audit program will commence in Fall 2007.

In cooperation with area schools, we will also offer basic training to volunteer students in grades 6 through 12 to enable them to conduct energy audits of their schools. This program has already commenced in Damariscotta's Great Salt Bay School.

An energy audit (6) is a systematic inspection of a house as an energy using system, with the aim of providing a prioritized list of steps a homeowner may take to cost-effectively improve energy performance. The auditor is an independent professional, not part of the construction team that may perform the actual home improvement. A follow-up audit may also be performed to verify the results of any such improvements after the work is completed.

TRANSPORTATION ALTERNATIVES

Our regional transportation is dominated by the automobile. Public transit is next to nonexistent. Two-to three bus runs daily to Bangor and Portland completes the list, with no local service at all, other than the limited on-demand services offered to the elderly. And there is no scheduled train service anywhere north of Portland.

There are no bike lanes, making bicycling a dangerous undertaking on most area roads. To a lesser extent the same goes for the increasingly popular motor scooters.

Hybrids, especially Toyota's Prius are currently the best alternative. But Toyota is yet to offer the plug-in version in the U.S., although it is a standard option in Europe and Asia.

At present, electric cars are limited to low voltage (hence low speed) models, which, under current law, can not legally be driven on roads with posted speeds greater than 35 MPH. The higher speed, higher voltage electrics available in the U.S. are exorbitantly priced, limiting their appeal to the wealthy/ celebrity market.

One of our members is converting a gasoline-driven pickup-truck to highway speed electric power over this coming winter. And MGC is planning to invite as many exhibitors of alternative cars as possible, including economical highway speed electrics, such as Citicar (widely available in Europe), and France's "Air car" which runs on compressed air and is currently marketed in Mexico and South Africa, motor scooters that get up to 100 miles to the gallon, bicycles, electric bikes, and others.

New England badly needs such alternatives and, of course, a sensible plan to reintroduce public transit along such major traffic corridors as U.S. Rt. 1, the Eastern Maine Railroad between Brunswick and Rockland and Brunswick and Augusta, Rt. 17 between Rockland and Augusta, Rt. 3 between Belfast and Augusta and Rt. 27 from Boothbay to Augusta.

Permitting low speed electrics on roads with posted speeds up to 45-50 MPH, and the establishment of bikeways would also be of great help.

References:

(1) NE States would be the 7th country in the world for greenhouse gas emissions: Energy Information Administration (EIA), *International Energy Annual* (2003) and *Emissions of GHG in the U.S.* (2004)

(2) Northeast State Sector Emissions: Union of Concerned Scientists www.ucsusa.org / Northeast Climate Impacts Assessment (2006) www.northeastclimateimpacts.org

(3) Global Emissions by Sector: Sir Nicholas Stern's Climate Change Review, (2006), London, UK

(4) Feed-in Tariff overview: (Power Point by Paul Gipe, wind-works.org)

www.wind-works.org/FeedLaws/USA/ASES%20Feed-in%20Tariff%20Ontario%20SOP%20Paul%20Gipe.pdf

Google "Feed-in Tariff" for a plethora of references

(5) Passivhaus Building Standard (new construction requiring no heating system):

Passivhaus Institut (Darmstadt, Germany) www.passiv.de

(6) Residential Energy Audits (energy efficiency in existing housing): Building Performance Institute, *Building Technician*, *Building Analyst Field Guide*; John Krigger & Chris Dorsi, *Residential Energy: Cost Savings and Comfort for Existing Buildings*