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

(notes by Paul Kando)

The Midcost Green Collaborative was formed by a group of local citizens. We observed that global warming and consequent climate change were becoming recognized around the world as a crisis demanding attention and action. A number of nations 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. China is one example: a scant few years ago their share of the world solar cell market was 1% then they introduced feed-in tariff, creating a huge domestic market. Today they are world leaders with a more than 33% market share.

Our intention is to put the Damariscotta area on the map as one of Maine's premier renewable energy centers, where businesses offering alternative energy products and services flourish and grow, providing of well paying jobs. 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. Expos have been held annually since, 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. 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:

	Northeast	Global
Industry	13%	14%
Electric power generation	30%	24%
Buildings (residential & commercial)	22%	8%
Transportation	35% (Maine 50%)	14%

These percentages indicate disproportionately high regional energy consumption for power generation. Aging fossil fueled plants located away from communities, have an average efficiency of only 33%. The rest is low-grade heat going to waste. The power grid loses an additional 10-20% in transmission losses. Our buildings are also very inefficient -- the typical New England home uses, square foot by square foot, more than twice the energy of a European one. As to transportation, our means of getting around is almost exclusively the automobile.

To reduce both our greenhouse gas emissions and our energy costs, we must focus on these three major sectors. Therefore we strive to demonstrate cost effective energy alternatives in all three areas. Each also represents significant economic opportunity. To each we are taking a common sense approach: First, eliminate all energy waste. Second, take advantage of all "free" energy sources found nearby. Third, employ alternative energy technologies only to supply the energy requirements that still remain, minimizing the size and cost of any renewable energy system, maximizing its efficiency.

ELECTRIC POWER GENERATION: FEED-IN TARIIFS

Our primary focus here has been a policy initiative, based on some highly successful international 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 energy they purchase from the grid. This never involves any cash payment to the distributed generator, who actually suffers a financial 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 detail, 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 a 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 world leaders Japan an China.

Several U.S. jurisdictions have adopted feed-in tariffs. We feel a feed-in tariff law will be a significant economic development tool for Maine as well.

PASSIVHAUS: DEMONSTRATING ENERGY EFFICIENCY IN NEW HOUSING

We promote the construction of new houses and buildings that require no space heating system in our climate. Such houses meet the German Passivhaus standard, currently the most demanding in the world.

The principle of Passivhaus is simple: first eliminate all energy waste, second, utilize energy resources found in the location, third, employ alternative energy technologies only to supply the energy requirements that still remain. Passivhaus, is 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 and can easily be upgraded to a net energy producer.

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

1. The building must not use more than 15 kWh/m^2/year (4755 Btu/ft^2/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/m^2/hour

2. 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.

3. Total primary combined energy consumption for heating, cooling, water heating and electricity for all uses must not exceed120 kWh/m^2/year

These standards are much higher than typical 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 means 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. Passivhaus buildings include only a small auxiliary heating element, usually as part of the central ventilation system required to maintain air quality.

Experience has shown that, in Europe, such buildings can be built for approximately the same cost as ordinary buildings anywhere below the 60^{th} parallel (above which extra costs are incurred. (We are near the 44^{th} parallel) The main reason is that while the building envelope is more expensive to construct, the need for a heating system is eliminated.

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

• Compact form and good insulation (U=0.15 W/m^2K; 0.026 $Btu/h/ft^2/^oF$ – about R 60 all around in our climate) - *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 W/m^2K; 0.14 $Btu/h/ft^2/^oF$)

• Air tight 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 $4l^oF$
(5^oC)

• 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 a heat pump 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, with the help of a Maine Community Foundation grant acquired the necessary instrumentation for professional energy audits. The use of this equipment will is shared by our members who are Maine State certified residential energy auditors. Our audits are offered at discounted rates to area homeowners.

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

TRANSPORTATION ALTERNATIVES

The automobile dominates our regional transportation. 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 in Midcoast Maine other than a summer excursion train run as a tourist attraction.

There are no bike lanes, making bicycling a dangerous undertaking on must area roads. To a lesser extent the same goes for motor scooters. Hybrids, especially Toyota's Prius are currently the best alternative. But no car maker yet to offers the plug-in version of a hybrid car 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 has converting a gasoline pickup truck to highway speed electric power. And MGC is planning to invite to our Expos as many exhibitors of alternative cars as possible, including economical highway speed electrics, such as Citicar (widely available in Europe), and India's "Air car" which runs on compressed air and was test-marketed in Mexico and South Africa, motor scooters that get up to 100 miles to the gallon, bicycles, electric bikes, and others are also welcome..

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 and beyond, 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 be of great help on the policy lever. Other than commuters to Augusta and Portland, most Midcoast Mainers use their cars mostly on shorter runs. Under the proper conditions, it would be no hardship to drive to a local store or to a local train station in a 25-30 MPH top-speed electric vehicle especially if parking spots with electricity to charge the vehicle.