TOWN ENERGY PANNING: A FRAMEWORK FOR ACTION

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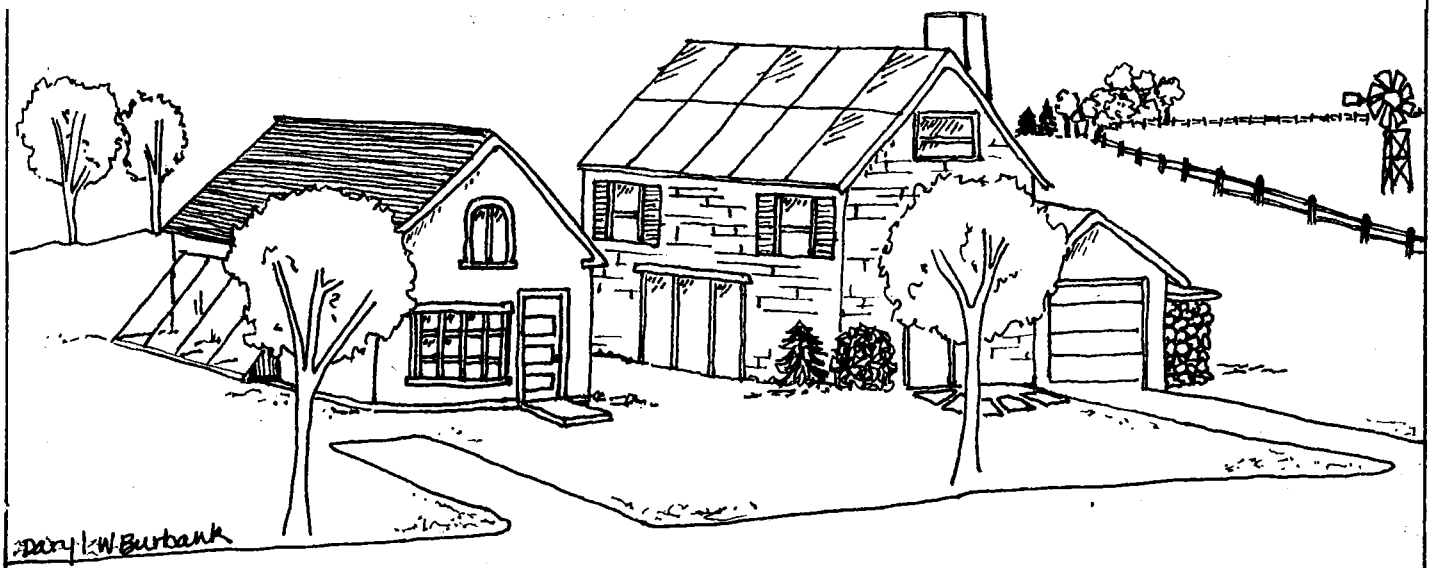

TOWN ENERGY PLANNING: A FRAMEWORK FOR ACTION

A two-part booklet to aid towns in planning for a secure and affordable energy future and in implementing local energy actions

By

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Town Energy Planning: A Framework for Action

AN INTRODUCTION

Why Energy Planning and Local Energy Action?

A 1980 survey conducted of Vermont town officials by the UVM Extension Service revealed that energy conservation and energy planning ranked first and seventh respectively among 99 proposed priorities. This response is not surprising in light of an increase in fuel oil prices from $.20 per gallon in 1972 to $1.30 a gallon in 1980 over a six-fold increase (State Energy Office). This rapid rise in the price of oil has resulted in an increasingly larger share of our incomes spent on energy. This impact is especially hard felt in Vermont which has an exceptionally long and severe heating season.

The impact of these price increases gains even greater significance considering the fact that Vermont is dependent on outside sources (imported from out of the state) to meet over 80% of its energy requirements and is dependent on petroleum for approximately 65% of its energy (SED, 1980). Several studies have found that more than 85% of the total money spent on imported energy leaves the community (Donovan, 1979; Morris, 1979). This results in -a drain on the local economy in terms of employment and income, which is magnified by rising energy prices.

The response by town officials indicates the concern for action to reduce our massive expenditures on conventional energy resources (i.e., oil, gas, and coal), and the resultant flow of dollars and jobs out of the community. The pathway to reducing our outside energy dependence involves energy conservation and the development of local, renewable energy resources (i.e., solar, hydro, wood, and wind). Not only do these measures save dollars otherwise spent on outside energy, but they also promote expenditures within the community both directly and through the mUltiplier effect. Money that does not go out of the area circulates through the local economy and creates more jobs, finances more investments, and pays for more wages.

Local energy planning provides a way to systematically review areas in which energy affects our lives, and a framework from which to undertake energy projects to reduce our dependence on costly imported sources. Most importantly, planning provides a vehicle for individuals to participate and help create a more secure and affordable energy future.

A Suggested Course of Action

A plan is only as successful as the support it receives from the townspeople and local government officials. A plan derives its value from the

diligence to which it is used as a guiding document for matters which concern the town. The most successful energy plans in the country have come from broad-based citizen input campaigns designed to solicit the needs and values of the community. Obtaining this input is often a difficult task, since many people may not perceive either the benefits of local energy planning or energy projects to be a top priority. Therefore, raising the "energy consciousness" of a community is often thought to be a key ingredient to successful planning and action.

A community-wide outreach project designed to reach and inform as many residents as possible can be successful in raising the community's "energy consciousness". Such a project might include getting people to actually look at how rising energy prices are affecting their lives, and informing them about the benefits of energy conservation and renewable energy measures.

Implementing energy conservation measures in town buildings has also been a successful starting point in a town energy program. Oftentimes, people may look to the town government to set an example and show the importance of taking such measures.

It is important to start with workable projects that yield short-term economic benefits. A small successful project lays the groundwork for larger and longer range ones.

Once the energy consciousness of a community has been raised, energy and its impacts may become an increased priority. A successful planning process involving widespread community support can be initiated. Your community may already be aware and significantly concerned about energy issues. Local energy projects may have already been undertaken. In that case, your community may be ready to further define its direction and goals by developing a town energy plan, and proceed toward greater energy security.

Contents of This Booklet

This booklet contains two parts: "A Guide to Developing a Town Energy Plan" -- This guide is designed to show towns the range of energy issues which can be addressed at the local level. It serves as the framework for initiating the energy planning process to examine needs and resources, explore strategies, and develop energy actions. The guide contains brief descriptions of specific action projects which can be implemented at the local level.

"A Local Energy Project Handbook" -- The Handbook further details and offers a step-by-step approach to some of the action projects described briefly in the Guide.

A GUIDE TO DEVELOPING A TOWN ENERGY PLAN

A GUIDE TO DEVELOPING A TOWN ENERGY PLAN

Use of This Guide

This policy guide can fulfill two purposes:

1. It can serve as a guide for Energy Coordinators/Committees to help in choosing a course of action and undertake energy projects. The five policy areas serve as distinct categories from which energy issues can be addressed at the local level.

2. It can serve as a guide for Energy Coordinators/Committees to help in formulating a Town Energy Plan. This Energy Plan would ideally be adopted by selectmen either as a supplement to the Town Master Plan or as an integral part of the Town Master Plan. The Town Energy Plan serves as:

   - the conceptual and legal basis for energy conscious zoning and subdivision ordinances.

   a policy guide at the local level in Act 250 hearings by the District Environmental Commission

   official policy for the town on energy issues

   A suggested format for the Energy Plan can be found in Appendix A, "The Middlesex Energy Plan".

Guide Format

The guide is structured around a set of five policy areas. These policy areas are:

1. Town buildings and operations
2. Residential and commercial buildings
3. Renewable energy resources
4. Land use
5. Transportation

Each policy area includes a set of action projects. Some projects are based on bringing various members of the community together to undertake conservation and the development of renewable energy resources. Volunteer weatherization crews, fuelwood cooperatives, and carpooling are three examples.

Other projects require the direct involvement by the town government. Examples include developing appropriate land use by-laws, appropriating funds for conservation measures in town buildings, and managing the town forest for fuelwood.

Energy Usage and Impact Study

The Energy Coordinator/Committee may wish to undertake an energy usage and impact study to show the effect rising energy prices have on personal incomes and budget demands. Specific figures for town buildings and rougher figures for the community as a whole can be gathered to show the total energy dollars spent in one year, energy dollars spent per household, and the amount of dollars leaving the community. These figures, even with a 20% accuracy margin, can be used as a tool to show the town and its residents the seriousness of our energy predicament and the pathways out of it.

Energy and Power by Bensen, is a guidebook which shows a simplified step by step approach to assessing energy usage and its impacts. Such a study was done for the town of Danville, Vermont. (See Appendix

Energy Needs Assessment

The Energy Coordinator/Committee may also want to assess the energy needs of the community through a survey. Surveys can provide valuable information about housing conditions, extent of conservation and renewable energy measures undertaken, and emergency preparedness. A sample survey was conducted by the town of Rupert, Vermont (see Appendix C).

Policy Area #1: Town Buildings and Operations

Energy conservation and the use of renewable energy resources should be encouraged in town buildings and operations.

Justification:

The survey of Vermont town officials which revealed energy conservation to be the top priority indicates a strong belief in the potential of conservation to save on budget costs. As town budgets become tighter, and needed town services compete for the same limited funds, local governments are especially eager to reduce unnecessary budget costs. Energy costs have risen faster than the rate of inflation since 1973, and consequently have reduced the amount of money towns have to spend on other needs and services.

To reverse the increasing budget demands of energy costs, towns can undertake cost-effective conservation measures and renewable energy modifications in town buildings, introduce no-cost operational changes, purchase more energy-efficient vehicles, invest in efficient street lighting, and install renewable energy heating systems.

When first setting out to tackle town energy consumption, projects which yield almost immediate returns on their investment (i.e., weatherstripping and caulking) and which have small budgets, are most likely to be considered for funding by the selectmen. A successful project will lead the way to projects with longer returns on their investment and larger bUdgets.

In the town of Danville, energy expenditures increased from 4% of the town budget in 1972 to 8% of the budget in 1980. Adjusted for inflation, energy costs to the town increased 64%, with no new energy commitments. During this time, the town added some insulation, weatherstripping, storm windows, and replaced an oil furnace with one fueled by propane. These measures reduced total energy expenditures from what they would have been had no action been taken, yet energy still demanded an increasingly larger share of the budget.

Objectives

1. To systematically reduce energy costs in town buildings, it is recommended to:

    a. Complete energy audits in all town buildings to determine how much energy is used, identify areas of energy waste and areas of potential savings, and identify areas for potential renewable energy modifications.

b. Prepare a list of prioritized cost-effective measures, and their estimated costs. When establishing priorities for undertaking conservation measures and renewable energy modifications, use a costing policy which includes the full cost of energy use and related costs over the life of the investment.

c. Prepare an item at a regular interval (i.e. yearly) for presentation to the selectmen requesting appropriations for cost-effective conservation measures and renewable energy modifications.

d. Implement the approved measures and modifications, and monitor energy use to evaluate their impact.

2. To reduce energy costs in town operations, it is recommended to use a life cycle costing policy in evaluating any decisions concerning the purchase by the town of any equipment, vehicle, or other item requiring the consumption of energy.

Action Projects

1. Two Financial Policies for Energy-Related Investments

As energy costs continue to consume an increasingly larger share of towns' budgets, expenditures for energy related investments wi11 require greater scrutiny. Investment decisions for weatherization measures in town buildings, energy-efficient vehicles, furnaces, street lighting, and equipment should utilize financial policies which include the full cost of energy over the useful life of the project. Two such financial policies are the simple payback period and life cycle costing. The simple payback period is an excellent tool for ranking proposed energy conservation measures in buildings. Life cycle costing is a useful tool in evaluating the purchase of an item which actually uses energy to operate, i.e., a vehicle or furnace.

2. Financing Energy Conservation Measures and Renewable Energy Modifications in Town Buildings

A variety of financing options are available for implementing energy conservation and renewable energy measures. Projects can be funded: 1) out of the town's discretionary funds, 2) as a budget item, 3) as a separate item on the town warning requested out of general revenue funds, or in the form of a bond issue, and 4) through leasing arrangements. A project's budget size depends on how important conservation and renewable energy is viewed in the community, and how receptive the community may be to funding out of general revenues versus a bond issue. Choosing the optimal financing option depends on understanding the trade-offs involved in each choice.

3. Actual Conservation Measures and Renewable Energy Modifications

The State Energy Office has information on actual measures and modifications which can be undertaken.

4. Building Energy Audits

Free energy audits are available by the Home Energy Audit Team (H.E.A.T.) through the UVM Extension Service and the State Energy Office. For a list of firms that conduct in-depth engineering studies (t,e., to examine the added stress on a structure due to increased snow load from insulation), consult the State Energy Office.

Policy Area #2: Residential and Commercial Buildings

Energy conservation should be encouraged in all residential and commercial buildings.

Justification

Energy use in homes accounts for 36% of all energy consumed in the state, according to a 1979 Vermont Energy Advisory Board Report. At the time of the 1970 census, two-thirds of the state's 150,000 homes had no or inadequate insulation. Estimates reveal that simple weatherstripping and caulking can reduce energy consumption at least 15% in the average home, and insulating up to cost-effective levels can reduce consumption another 25%.

The main obstacles to achieving this reduction appears to be a "transfer of information" gap and financial limitations. Projects can be undertaken at the local level which help to inform the community about appropriate weatherization measures and which expand the community's financing opportunities.

In 1980, the residents of Montpelier spent approximately $4,390,700 for building energy requirements, which computes to an average of $1,490 per household. As indicated above, cost-effective weatherization measures could reduce energy use by 40% in the average home or business.

Objectives

1. To provide educational opportunities to the residents about:

   - Areas in the home or business place which lose energy;
   - Economic weatherization levels;
   - Types, costs, and installation of appropriate materials;
   - Existing financing opportunities for the purchase of materials;
   - Energy curricula for schools.

2. To investigate, and implement as feasible, group purchasing and financing programs.

3. To make available information on energy conserving building construction standards, site design, landscaping techniques, and other appropriate information to applicants for new building permits and other interested persons.

4. To encourage homeowners to make available energy audit information upon resale of the house.

Action Projects

1. Community Button-Up Project

A Community Button-Up Project is a locally designed and administered energy conservation project. The scope of the project may vary within each community depending upon local resources, leadership, and creativity. The major goal of a Community Button-Up Project is to educate and mobilize a significant'number of citizens to undertake low cost weatherization measures in their homes. This can be achieved' through an extensive pUblicity and outreach effort, hands-on workshops, and the distribution of do-it-yourself booklets. This type of project usually occurs during a concentrated 2-3 month effort, often in the fall as people prepare for the winter. A Community Button-Up Project can help build a local constituency of leadership and residents to address more comprehensive energy problems and needs over the long term.

2. Volunteer Weatherization Crews

Volunteer weatherization crews fulfill the important task of conducting mini-energy audits and installing low cost weatherization materials in the homes of residents unable to do so themselves, such as the elderly and disabled. The crews are comprised of local community volunteers ranging in age from senior citizens to high school youths. This program fits in extremely well with the Community Button-Up Project, and both have been conducted simultaneously in other towns.

3. Energy Conservation Package

An information packet containing tips on how to maximize energy conservation and the benefits of renewable energy can be designed to accompany all permits for new building construction and be given to any interested persons. The packet should contain existing pamphlets put out by various state agencies and private groups on topics such as: building conatructLon standards, proper weatherization levels, site location, landscaping techniques, wood stove safety, financing opportunities, and information about renewable energy systems.

4. Community Insulation Project

This project encourages residents and businesses to obtain insulation contracting by taking advantage of group rates during the off-season. The success of the project depends on the degree of participation from the local community, institutions, and agencies. In Northampton, Massachusetts, the residents saved 20-25% of the cost of insulating attics, and recovered their costs of insulating within 1-2 years through reduced energy bills.

5. Fuel Oil Cooperative

A fuel oil cooperative is an arrangement among community members to purchase fuel oil at a lower price per gallon than the market price. Households can receive bulk rate discounts by buying in large quantities and/or buying from a given location which reduces the fuel oil dealer's delivery costs. As an example, a household with an average fuel consumption of 1,000 gallons a year, with a discount of 6 cents a gallon can save $60 a year on their fuel bills.

6. Energy-Related Financing Opportunities, Tax Credits, and Energy Assistance Programs

Financial limitations can often be an obstacle to undertaking energy conservation measures. There are several state and federal programs designed to help individuals learn about and finance conservation measures. Individuals may be unaware of the various programs available. A community-wide information project can help spread the word.

7. Energy Audits

The Home Energy Audit Team (H.E.A.T.) will give free energy audits to help assess areas of heat loss and potential savings. The Women's Club of Lyndonville did a door-to-door sign-up campaign for energy audits. The Residential Conservation Corporation (RCC) will write up specifications for energy conservation materials and costs.

Policy Area #3: Renewable Energy Resources

The use of local, renewable energy resources should be encouraged to replace outside, non-renewable energy resources.

Justification

Local, renewable energy resources (Le., wood, solar, water, and wind) offer advantages to the community on many different levels. Qn an individual level, renewables are often cost-effective when compared to their non-renewable counterparts (i.e., oil, coal, and gas). For instance, wood costs about half the price of oil per BTU of energy (SEQ). The inclusion of passive solar design in new home construction can supply up to 20-25% of a building's space heating requirements while adding only marginally to the cost of construction. Solar domestic water heating systems, with 65% of the cost offered in tax rebates, can supply up to 50% of year-round hot water heating requirements and pay for itself in 4-8 years (SEQ).

Renewable energy resources are without exception found locally in Vermont while non-renewables are found almost exclusively outside of Vermont. Many studies indicate that for every dollar spent on outside energy resources, 85% of that dollar flows out of the community. This results in a drain on the local economy in terms of incomes and employment. In contrast, for every dollar spent on wood, only 12% of that dollar leaves the community (Greenfield, 1981). The rest remains in the local economy either in our own pockets or in payments to fuel wood suppliers. Additionally, local renewable energy resources, when compared to non-renewables, are not SUbject to embargos or politically induced shortages.

In Vermont there are already strong indicators that renewable energy resources are replacing non-renewables. Wood usage increased three-fold from 1975-1980, with an increase from 5% to 15% of our annual energy mix (SEQ). The number of solar domestic water heaters has doubled in each of the last four years (SEO, 1974-1980). Requests for permits to study hydroelectric feasibility have increased greatly in the latter 1970's and early 1980's.

Projects undertaken at the local level can encourage the development of local renewable energy resources by providing educational opportunities to the community and by increasing the availability of renewables at affordable prices.

Objectives

Fuelwood

To promote the use of wood, it is recommended to study the feasibility

and possibly implement the following:

1. Alternative options for securing fuelwood which use the services of local fuelwood suppliers and loggers. such as a fuelwood cooperative and information brokerage between dealers and users;

2. Promote the Use Value Tax Program for stimulating fuelwood production and improving management of our forests;

3. Provide information about the benefits of wood use and safety;

4. Manage the town forest for sawlogs and fuelwood for the benefit of the town and its residents;

5. Develop an emergency fuelwood stockpile for elderly and disabled citizens,

Solar and Wind

1. Encourage the use of solar construction techniques and solar and wind energy systems by providing educational opportunities ,to the community.

2. Adopt the property tax exemption legislation for renewable energy systems.

3. Map the optimum location for solar sites for new development and make this information available to the planning commission.

Hydro

1. Make information available to residents about existing dam sites and the procedures for developing hydroelectric power.

2. Undertake a preliminary site review of town owned hydro sites to examine the potential for developing hydroelectric power for the town's benefit.

Methane Gas

To study the feasibility and possibly implement:

1. Utilize methane gas from municipal sewage for the town's benefit.

2. Form a methane gas digester cooperative among local dairy farms.

Alcohol Fuel

To study the feasibility and implement if deemed appropriate an alcohol

fuels production facility.

Action Projects

1. Fuelwood Cooperative

A fuelwood cooperative is any arrangement among community members to secure fuelwood at a price per cord lower than the market price. Cooperative members make a willing commitment to substitute personal labor in return for a lower price. Some of the key components include democratic control, service at cost, and membership owned. This project details a specific arrangement where coop members receive uncut logs from local loggers and fuelwood dealers and then cut and split the logs to appropriate size.

2. Use Value Tax Program and Forestland

This state-wide program is designed to encourage the use of sound forest land and agricultural practices, and to ease developmental pressures caused by high property taxes. Landowners can choose to have their land appraised at use value (vs. fair market value, which is generally higher) in exchange for undertaking a management program for their woodlot or farmland. With 90% of Vermont's forestland in private ownership, these lands represent a sizeable and valuable resource for recreation, wildlife, watershed protection, .timber and fuelwood production. A community-wide educational project can increase the understanding of how the Use Value Tax Program works.

3. Town Forest Management

There are about 121 town forests in Vermont, totalling 38,524 acres. All town forests are under some management at some level by the Department of Forests, Parks, and Recreation. Some are used very intensively for multiple use and wood products, some for wood products only, some for watersheds, and some for recreation. However, many town forests could be managed more intensively to provide income to the town, increase the availability of fuelwood, increase wildlife habitat and for other resources. County foresters can conduct a preliminary inventory of your town forest, if one hasn't been done in the past or in recent times. Due to changes in priorities and reduced budgets within the Department of FPR, many towns are retaining a private forester for management services. A private forester can manage the forest on a continual basis through the development of a long-term management plan.

4. Emergency Fuelwood stockpile

An emergency fuelwood stockpile can help mitigate the impacts and provide short-term relief to elderly and disabled persons who run out of wood during the winter. These families may improperly plan for, or have insufficient financial resources, to secure their total fuelwood requirements for the winter. Temporary shortages may occur during critical times. A stockpile could alleviate hardships until a supply can be found.

5. Solar, Wind, and Wood Safety Outreach Program

A community outreach project can help inform the community about existing renewable energy systems available, their operation and safe use, costs, and financing opportunities.

6. Property Tax Exemption for Alternative Energy Facilities

In 1975, the state of Vermont passed enabling legislation (32 V.S.A. 34) allowing towns in Vermont to vote to "exempt alternative energy sources from real and personal property taxation." As of 1982, approximately 40 towns have adopted such an ordinance, most of them adopting the wording of the state statute verbatim. However, the state's wording allows for a wide range of interpretations as to what exactly is included in the definition of an alternative energy facility and its components. This ambiguity may partially explain the rejection of the ordinance in several towns, including Brattleboro (1977), Middlesex (1980), and Waitsfield (1982). Towns may be more willing to pass an ordinance in which:

- the ordinance specifies what alternative energy facilities and components are eligible for exemption; and

  the suggestions of selectmen, town officials, and townspeople are solicited as to what facilities and components should be' eligible for exemption.

7. Mapping Optimum Solar Sites

This basically involves locating slopes in the town with a southern exposure. A simple map of southern slopes can be developed by looking at topographical maps available from the U.S. Geological Survey. An actual on-site review can be undertaken to check for solar interference from neighboring hillsides.

8. Hydroelectric Development

There are over 150 existing dam sites in Vermont over 50 kw, with a potential to provide 134 megawatts (Warshow). Though hydroelectric development at existing dam sites may be cost-effective when compared to new

oil and nuclear generating facilities, the procedure for developing a hydro facility is a long and complicated one. The Public Service Board has information on existing dam sites in your town, and also distributes a comprehensive guide, Vermont Hydroelectric Development Handbook, for a review of the necessary permits, procedures, and identification of critical issues.

9. Methane Gas Digester Cooperative

One of the major impediments to the development of methane gas production from manure is the high initial investment cost. Pooling resources can overcome this limitation. Methane can be converted to electricity and sold to the local utility. Contact the UVM Extension Service for information about methane production from cow manure.

10. Town Owned Alcohol Fuels Development

An alcohol fuels distillery that utilizes fermentable municipal waste products (newspaper, leaves, grass, wood, etc.) can produce fuel for town vehicles. The City of Barre plans to utilize excess methane from their digesters to.provide heat and electricity for the conversion process.

Policy Area #4: Land Use

Ener-gy conservation and the development of renewable energy resources should be encouraged through the use of appropriate land use control by-laws.

Justification

The concept of utilizing appropriate land use control by-laws to facilitate energy conservation and the development of renewable energy resources has been around for some time. However, its significance has grown markedly with the advent of spiraling fossil fuel prices. Energy conservation through proper land use planning is a long-range strategy aimed at saving energy that would otherwise be lost through inefficient settlement patterns and site designs. Encouraging settlement patterns in proximity to main transportation routes and commercial centers reduces traveling distances, and, consequently, transportation energy requirements. Site design which utilizes the physical features of the land and landscaping techniques can significantly reduce building energy requirements for heating and cooling.

EXisting by-laws can deter the development of renewable energy resources in two ways. First, they can impede the initial installation of a renewable energy system by restricting building height, building setbacks, floor area, lot sizes, and ground coverage. Second, they may offer little protection for access to renewable energy resources once a system is installed (Kellington, 1980). By-laws can be amended and adopted which encourage the development of renewab1es by removing barriers, protecting rights to solar ,access, and go one step further, by actually promoting their development.

In July, 1980, legislation became effective amending the Vermont Planning and Development Act to facilitate energy conservation and the development of renewable energy resources. The legislation enables municipalities to adopt a wide range of by-law amendments through the planning and land use control processes.

Objectives

1. To encourage the development of settlement patterns and the use of site designs which minimize the consumption of outside energy resources.

2. To remove barriers to the development of renewable energy resources, and to protect and promote acoesr for their efficient use.

Action Projects

1. Land Use Planning: Facilitating Energy Conservation and the Use of Renewable Energy Resources

There are a variety of provisions in the Vermont Municipal and Regional Planning and Development Act (Title 24, Chapter 117) which enable municipalities to develop policies which facilitate energy conservation and the utilization of renewable energy resources and implement them by adopting or amending land-use control bylaws. Land use policies offer one of the most effective means for influencing future energy use in a community.

2. Plan and By-Law Amendment and Adoption Procedures

The process for amending and adopting plans and by-laws can be complicated and must be followed closely to insure their legality. A rigorous set of procedures must be followed in presenting amendments before the planning commission and/or board of adjustment, the community, and the selectmen. A time frame chart and procedural checklist provided by the Agency of Development and Community Affairs, details the procedures and time requirements for adopting and amending plans and by-laws. Regional Planning Commissions can give further technical help.

Policy Area #5: Transportation

Transportation energy conservation should be encouraged by promoting efficient modes of travel and travel patterns.

Justification

Vermont has always been considered to be one of the most rural states in the nation. Widely scattered settlement patterns and relatively long commuting distances to work, shopping, and other services contribute to Vermont ranking first among New England states for number of miles traveled per vehicle.

Gasoline consumption for the state has shown a steady decline over the last three years, as rising fuel prices, more efficient automobiles, and other factors have taken effect (SEO). However, projects at the local level can help this trend along by promoting modes of travel for the individual which are more efficient than the single passenger automobile.

The residents of the Central Vermont region spent approximately $21,580,000 for transportation energy requirements in 1979, or almost 48% of their total energy expenditures (Zahner, 1982). (Figures are based on state averages.)

Objectives

1. Support and assist existing car and vanpool programs.
2. Study the feasibility of a commuter parking lot.
3. Promote pedestrian, bicycle, and other non-motorized modes of travel.
4. Explore the feasibility of developing some type of mass transit system in conjunction with neighboring communities.

Action Projects

1. Vanpooling and Carpooling

Vanpooling and carpooling can reduce the expenses per person incurred for travel, traffic congestion, pollution, in addition to conserving energy. The State Energy Office coordinates a well-established car and vanpooling program. Communities can promote the program by:

- establishing a commuter parking area

- establishing a commuter board in a local store or town building for name exchange, destination, etc.

- general promotion through media, workshops, etc.

2. Pedestrian and Bicycle Paths

Walking and bicycling not only use no gasoline, but are also non-polluting and beneficial for our health. The establishment of pathways for this purpose in the village or town centers can help reduce motorized vehicle use by providing a safe, well-defined avenue for travel between stores, schools, home, and work. An affordable alternative to the construction of new bike paths, might simply involve sectioning off the right margin of popularly traveled roads with a yellow line and putting up signs stating "Bike Path".

3. Alternative Mass Transit Systems

Alternatives to the traditional bus system exist which can be economically viable with certain population densities. A Car-Hopper system utilizes a certified driver who stops at roadside shelters, picks up riders for a fare, and drops them off at places along the route. The only cost incurred by municipalities would be for the cost of shelters. A subscription bus service utilizes a vehicle in which people can sign up for the service the day the vehicle is in their area. Success of these types of projects would require several neighboring communities to join together to make the project economically viable. The Central Vermont Regional Planning Commission has information on establishing alternatives to mass transit.

APPENDIX A

Middlesex Energy Plan

For inclusion in the body of the Middlesex Town Plan

Final Draft

I. Purpose of the Plan: Energy has become an important factor in nearly all questions of public policy and many private decisions as well. The cost of energy is now a major line item in government, business, and personal budgets. This Plan is designed to assist in the decision-making process and to help ease the economic burden facing the town.

II. Goal: The Town and residents of Middlesex shall reduce their dependence on costly, outside energy resources by encouraging conservation and the development of local, renewable energy resources. To accomplish this goal, the Town shall provide educational opportunities, use a costing policy for municipal expenditures, and adopt appropriate land use policies.

III. Inventory: The inventory will include:

1. Renewable Energy -

   a. Wood the potential quantity of fuelwood based upon the Washington County Fuelwood Survey.

   b. Hydro The location of existing dam sites in the Town.

   c. Solar A map of potential solar sites based upon topographic maps of the Town.

2. Community Facilities/Services

   a. Schools The number of dollars spent on energy for the current year, past years, and projected trends with no conservation measures undertaken. Also, a brief discussion of the energy audit findings and past conservation measures undertaken, along with planned measures.

   b. Town Buildings - Similar to information obtained for schools.

   c. Town Forest - A list of forested sites owned by the Town, and prospects for consolidation.

3. Cost of Energy and Impacts

   a. Total dollars spent on energy Town, Residential, Commercial, and Transportation. The analysis wi11 include the percentage of dollars spent on energy leaving the community and the percentage of income spent per household on energy.

IV. Recommendations

Land Use

1. Land use policies are important in facilitating energy conservation and the development of renewable energy resources. Land use planning can save energy that would otherwise be lost through inefficient site designs and settlement patterns.

   a. In site design, it is recommended to:

      i. Encourage building development on southern slopes.

      ii. Encourage building development in areas sheltered from wind.

      iii. Encourage the use of vegetation as wind buffers and for shading during summer months.

      iv. Encourage building orientation to the south through any combination of street, lot, or building layout.

   In new settlements, it is recommended to:

      i. Encourage the development of commercial services in or near residential areas.

      ii. Encourage residential development along major transit routes, and near employment areas, commercial districts, and shopping areas.

   Land use policies should not restrict the installation of renewable energy systems through minimum setback and sideyard requirements.

   b. Land use policies should provide access for renewable energy resources by protecting them from interference cast by new structures.

Implementation:

   a. In planned residential development provasi.ons, it is encouraged to consider the preceding land use recommendations for energy conservation and the development of renewable energy resources.

   b. In the zoning regulations, it is encouraged to consider the preceding land use recommendations for conserving energy in the location of new settlements and for protecting access for renewable energy systems.

Renewable Energy Resources

Local renewable energy resources (wood, solar, hydro, and wind) offer advantages over non-renewable energy resources (oil, gas, and coal) on many different levels. On an individual level, renewables are often cost-effective when compared to their non-renewable counterparts. For instance, wood costs about 1/2 the price of oil for equivalent amounts of energy.

Renewable energy resources are found locally in Vermont while non-renewables are found almost exclusively outside of Vermont. Many studies indicate that for every dollar spent on outside energy resources 85% of that dollar flows out of the community. This results in a drain on the local economy in terms of incomes and employment. In contrast, for every dollar spent on wood only 12% of that dollar leaves the community; the rest remains in the local economy either in our own pockets or in payments to fuelwood suppliers.

Additionally, local renewable energy resources are not subject to embargos of politically induced shortages. The development of local renewable energy resources should be promoted at the community level.

Implementation:

1. Wood - To promote the use of wood, it is recommended to study the feasibility, and implement if deemed appropriate:

    a. Alternative options for securing fuelwood which utilize the service of local fuelwood suppliers and loggers, such as a fuelwood cooperative and information brokerage between dealers and users.

    b. Promote the Use Value Tax Program for stimulating fuelwood production and improving management of our forests.

    c. Provide information about the benefits from wood use and safety.

    Hydro To make available to the residents information about existing dam sites, and the procedures for developing hydroelectric power.

2. Solar and Wind - To promote the use of solar and wind energy resources by providing educational opportunities and through appropriate zoning policie3.

Community Facilities/Services

Town Buildings and Operations - Energy costs have risen faster than the inflation rate since 1973, and consequently, have reduced the amount of money the Town has to spend on other needs and services. To reverse the increasing budget demands of energy expenditures, the Town should reduce its dependence

on oil by implementing cost-effective weatherization and renewable energy measures in town buildings, purchasing energy-efficient vehicles, and investing in efficient street lighting.

Implementation:

1. To systematically reduce energy costs in Town buildings, it is recommended to:

   a. Complete energy audits of all town buildings to determine how much energy is used, identify areas of energy waste and areas of potential savings, and identify areas for potential renewable energy modifications.

   b. Prepare a list of the prioritized cost-effective measures, along with estimated costs, which are planned.

      When establishing priorities for undertaking conservation and renewable energy modifications, use a costing policy which includes the full cost of energy use.

   c. Prepare an item (at regular intervals, Le., yearly) for presentation to the selectmen (and townspeople) requesting appropriations for cost-effective conservation measures and renewable energy modifications.

   To reduce energy costs in the Town operations, it is recommended to use a life cycle costing policy in evaluating any decisions concerning the purchase by the Town of any equipment, vehicle, or other item requiring the consumption of energy. A life cycle costing policy takes into consideration energy use over the life of the -investment, escalator rates for energy, and other energy related operational costs.

Town Forest - The Town currently owns several distinct parcels of forested land of varying sizes. Due to their relatively small sizes and separate locations, a single town forest may be unfeasible. However, a decent size Town Forest could provide recreational opportunities, wildlife habitat, watershed protection, saw logs, and fuelwood.

Implementation: The Town should consider forming a town forest by consolidating their land holdings.

Residential Energy Conservation - Energy usage in the home accounts for over a third of all energy consumed in the state. Estimates reveal that simple weatherstripping and caulking can reduce energy consumption at least 15% Ln the average home, and insulating up to cost-effective levels can reduce consumption another 25%. The main obstacles to achieving this reduction

appears to be information gaps and financial limitations.

Implementation: The Town should inform the residents about:

1. Areas in the home or business place which lose heat;
2. Economic weatherization levels, appropriate materials, and their installation;
3. Existing financing opportunities for the purchase of materials;
4. Siting and design of new, homes to maximize natural heating;
5. The potential for a group purchasing program for insulation.
6. Rumney School students about the economic and environmental advantages of conservation.

Transportation - Road maintenance and school bus services constitute the largest share of the Town's energy costs. Personal transportation requirements constitute the largest share of a familyOs energy costs.

Implementation:

1. The Town should limit expansion of its road system and of its maintenance levels to minimize the Town's transportation energy costs.
2. Consistent with state law and safety considerations, school bus services should be provided in a manner that maximizes energy efficiency.
3. Support and assist existing car and vanpool programs. Study the feasibility of a commuter lot in the Shady Rill/Rt. 2 area.
4. Promote pedestrian and bicycle use as alternative modes of travel.

Present Situation
1980

1,700	Approximate population for Danville according to 1980 U.S. Census figures.
623	Approximate number of year-round households and businesses according to Danville Grand List.
$785,385	Amount of money spent on residential and commercial energy use (lighting, heating, hot water, etc.)
$710,024	Amount of money spent on transportation energy use (excluding Town and School District vehicles).
$26,660	Amount of money spent on energy for Town buildings and vehicles.
$52,000	Amount of money spent on energy by the School District.
$1,574,069	Total dollars spent out of household income for energy.
$2,400	Average amount spent by each household on energy in 1980.
$12,531	Median adjusted gross income for Danville in 1980 according to Vermont State Tax Department.
19%	Percentage of adjusted gross income (per household) spent for energy consumption in 1980.
$1,275,519	Amount of money flowing directly out of Danville to pay for energy costs (81% of total energy costs).

Future Projections

$6,056,405	Amount of money (1980 dollars) spent on residential, commercial, and transportation energy costs in the year 2001 based on the following two assumptions:
2%	Assumed annual growth rate in energy consumption due to increased population and housing.
5%	Assumed annual rate of energy price increases over general economic inflation rate.

$6,480 Cost to each household. for energy in the year 2001.

51% Percentage of adjusted gross income spent on energy in year 2001.

Projected Annual Energy Costs for Danville in Year 2001 (1980 dollars)

Differential Rate*	0%	3%	5%	7%
Projected Energy Costs for Res., Comm,, and Trans. Sectors	$2,243,113	$4,037,604	$6,056,405	$8,748,140
Per Household Costs	2,400	4,320	6,480	9,360
% Adjusted Gross Income	19%	34%	51%	75%
Town Vehicles and Buildings Energy Costs	.$ 26,660	$ 47,988	$ 71,982	$ 103,974

A 2% annual growth rate is assumed for all the above cases.

One Alternative

$4,330 Approximate amount of money per household needed to install conservation measures in order to reduce residential and commercial energy use. (Does not include transportation energy use.)

$2,697,590 Total investments necessary to conserve energy in 632 year round residences and businesses.

$314,154 Amount of money saved during the first year in the .residential/commercial sectors. (40% of $785,385)

8.5 years Simple payback period for the conservation investment assuming that energy costs remain at inflation rates. Payback period will be much shorter if energy costs do exceed the inflation rate.

86 jobs A net gain of 32 jobs per 1 million dollars spent, are created by shifting capital resources from utility bills to conservation. (Shifting a million dollars away from utility bills destroys 18 jobs throughout the economy, while having that million dollars available in household income supports 50 jobs.)

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*The difference between the rate of inflation for energy costs and the general economic inflation rate provides a mechanism to generate figures for future energy costs in 1980 dollars.

Energy Use by Source

	Electric	Heating Oil	LPG	Wood	Kerosene	Gasoline	Total
Commercial and Residential							
Amount	4,820,000 kwh[1]	295,000 gallons	155,000 gallons	2,100 cords	30,500 gallons	602,000[2] gallons	
Unit price	$.045/kwh	$1/gal.	$.65/gal	$65/cord	$1.03/gal	$1.18/gal.:	
Cost	$221,720	$295,000	$100,750	$136,500	$31,415	$710,024	$1,495,409
Municipal (Town Hall, shed, and vehicles)							
Cost	2,561	4,206	2,922			16,971	26,660
School District Costs	19,996	22,755	105				52,000
Total Costs	$224,277	$321,961	$103,777	$136,500	$31,415	$736,139	$1,574,069
Amount Retained	14,854[3]	56,666 .	21,067	120,897[4]	3,990	80,976	298,450
Amount Exported	229,423	265,295	82,710	15,603	27,425	655,163	1,275,619
% Exported	94%	82%	80%	12%	87%	89%	81%

Notes:
1. Based on yearly average per household of 8,605/kwh
2. Based on 1,153 vehicles traveling an average of 12,035 miles per year, getting 20.6 mpg.
3. Approximate amount of property taxes collected from Green Mountain Power, Central Vermont Public Service Corporation, and Washington Electric Cooperative.
4. Based on an allowance of $7.43 in non-returnable expenses (chain saw oil, gas, etc.) per cord.

References

1. The basic methodology for this analysis is taken directly from Energy and Power by Elizabeth Schaefer and Jim Benson, Institute for Ecological Policies, Fairfax, Va., 1980.

2. Energy consumption figures for the residential, commercial, and transportation sectors are from:

    a. Heating oil, kerosene, and LPG - Private survey of petroleum distributors

    b. Electricity - State averages

    c. Wood - Danville Emergency Action Plan Survey

    d. Gasoline - Vermont Department of Motor Vehicles, and U.S. Dept. of Transportation publication entitled Highway Statistics

3. Energy cost figures for the Town buildings, shed, and vehicles, and the School District are from the Danville 1980 Annual Report.

4. Energy unit cost figures are from:

    a. Heating Oil, Gasoline, Kerosene - Heating Oil Prices and Margins U.S. Dept. of Energy, December, 1980.

    b. Electricity - State averages

    c. Wood and LPG - Approximate from local costs

5. Margin figures used to determine the amount of money spent on energy flowing out of the community are from:

    a. Heating Oil, LPG, Kerosene, and Gasoline - Heating Oil Prices and Margins, U.S. Dept. of Energy, December, 1980

    b. Electricity - Town Clerk's Office; property taxes paid by utilities

    c. Wood - Sub-contractor to St. Regis Paper Co.

6. Savings from conservation and job creation figures are based on a simplified version of Jobs and Energy by Jim Benson, Institute for Ecological Policies.

7. Average annual growth figures are based on 1970 and 1980 U.S. Census figures.

Miscellaneous

1. Total number of vehicles in Danville, based on: 349,503 (state total) x .0033 (Danville's proportional share of the stateOs population)

2. Diesel and coal were not included in the analysis due to their relatively insignificant share of the total.

3. Dollar savings per household for conservation is based upon a Heating Degree Day formula and approximate average of 8664 HDD for Danville.

APPENDIX C

TOWN OF RUPERT ENERGY QUESTIONNAIRE

March, 1981

Name _____ Road Name _____

Number of people in household _____ Number over age 65 _____

1. Please indicate the primary heating fuel you use to heat your home and any back up system that you use. For example, if you have an oil system but you primari use a wood cook stove, i.ndicate wood as the primary, and oil as back-up.

Type of Fuel	Primary	Back-up	Quantity used per year (cords,tons, gals., KWH, etc.)
Oil			
Wood			
Electricity			
Propane			
Solar			
Coal			
OTHER			

2. How large is your house in sq. ft. of floor area?
_____ Sq. ft. (length x width)

And how many sq. ft. do you heat to comfortable temparatures? _____

And what temperature do you find comfortable? _____ of

3. Do you normally close off part of the house in winter? YES _____ NO _____

If NO, could you close off part of it in the future? YES __ NO _____

4. If you heat by wood, do you use wood stoves? (Number _____)
and/or a wood furnace? _____

5. If you heat by oil, was your furnace converted from a wood or coal furnace? _____ Do you have a supplemental add-on boiler or heater? _____

6. How would you rate the heating efficiency of your house and your heating system?

Very Efficient _____
Satisfactory
Pretty Good (could use improvement) _____
Use a lot of fuel (could really use some improvements) _____
Really Costly (would like some help) _____

7. Do you have a satisfactory chimney to attach a wood stove or wood furnace if you don't already heat by wood? _____

8. Do you use a fireplace? YES NO _____

If YES, is it modified? _____

9. Do you use a portable space heater? _____ (Number)

If YES, is it electric? _____ Propane? _____ Oil? _____

INSULATION & WEATHERIZATION

1. Is your home insulated? YES ___ NO ___

If YES:

2. Walls - thickness of insulation ____ inches
   - type of insulation

3. Ceiling - thickness of insulation ____ inches
   - type of insulation

4. First story floor or foundation
   - thickness of insulation ____ inches
   - type of insulation

5. Does your house have:

A. Storm windows	YES ___	NO ___
B. Storm doors	YES ___	NO ___
C. Banked foundation	YES ___	NO ___
D. Vestibule or entry	YES ___	NO ___

SOLAR POTENTIAL & ORIENTATION

1. Is your home protected from the wind by trees or other structures?
   YES _____ NO ___

2. Do trees or other structures block sunlight from your house?
   YES _____ NO ___

3. Do you have a south facing roof? YES ___ NO ___

4. Are there major obstructions which would hamper the installation of solar panels on your roof? YES _____ NO ___

5. Is there ample space clear of objects for solar panels on the ground near your house? YES _____ NO ___

OTHER ENERGY USES

TRANSPORTATION:

1. Vehicles in household	Miles/ Gallon	Miles Driven To Work	Total Miles Driven/Year	Daily Destination Point
Vehicle 1				
Vehicle 2				
Vehicle 3				
Vehicle 4				

2. Do you carpool or vanpool? YES _ NO _

3. If NO, is carpooling or vanpooling a possibility? YES _ NO _ _ _

ALTERNATE ENERGY

WOOD: Answer if you use wood heat at all.

1. Do you buy the wood you use? YES NO _____

2. Do you cut your own wood? YES NO _____

3. If YES, on your own land? YES NO _____

4. On other land in town? YES NO ___

5. On land not in town? YES _____ NO _____

6. Do you own a woodlot? YES _____ NO _

7. If YES, number of acres _____

   Hardwood (percent, or acres)
   Softwood _____ (percent, or acres)

8. Do you sell wood? YES _____ NO _

9. If YES, how much per year (cords, bd, ft.)

10. Does your property have a potential for alternative energy generation?

	Already Developed	Would Like Help in Developing
Solar (heat)	_____	_____
Solar (hot water)	_____	_____
Hydro	_____	_____
Wind	_____	_____
Biomass (methane)	_____	_____

OTHER QUESTIONS

1. Do you believe that there is a national energy problem? YES _ _ _ NO _

2. Do you believe that there is a current energy problem in Vermont? YES _____ NO _ _ _

3. Do you believe your town or community should reduce its dependence on outside energy resources? YES NO _

4. Do you believe the town should be active in developing its own potential energy resources? YES _____ NO _____

5. Through what means do you think this should be accomplished?

STATE REGIONAL PLANNING COMMISSION TOWN _____
ENERGY BOARD SCHOOL NEIGHBORHOOD GROUP _____
INDIVIDUAL , OTHERS _____

WAYS THE TOWN CAN HELP YOU

1. Would you like to have an energy audit done on your house? YES _ NO _

2. If you use wood, are you having difficulty obtaining adequate supply? YES _____ NO _____

3. If YES, would you like to have the town coordinating information on wood? YES _____ NO _____ Other suggestions _
_____

4. Do you want information on managing your wood lot? YES NO _

5. What do you think should be done with solid waste? LANDFILL _____
RECYCLING CENTER _____, USE FOR FUEL SUPPLY _____ OTHER _

6. Would you like to have your wood stove installation or chimney inspected by the fire department? YES NO _____

7. Would you like information on energy tax credits or loan program incentives? YES NO _____

8. Do you need information on energy hardware? (stoves, solar water heaters, greenhouse additions, insulation, etc.) YES _____ NO _____

9. Would you like to have information on carpooling or other ride sharing? YES _____ NO _____

10. Do you have extra firewood stacked and dry, and would you be willing to sell some in an emergency? YES _____ NO _____

11. Do you have any comments on this survey? _____
_____ _____ _____
_____ _____ _____
_____ _____

Thank you for your assistance.

References Cited

1. University of Vermont Cooperative Extension Service and Vermont Department of Housing and Community Affairs, "Training Needs of Vermont Town Officials", Montpelier, Vermont, February, 1981.

2. Vermont State Energy Office, Vermont Energy Statistics, 1975-1980, Montpelier, Vermont, September, 1981.

3. Christine T. Donovan, et. al., Energy Self-Sufficiency in Northampton, Massachusetts. Hampshire College, Amherst, Massachusetts, 1979.

4. David Morris, Planning for Energy Self-Reliance: A Case Study of the District of Columbia. Institute for Local Self-Reliance, Washington, D.C., 1979.

5. Jim Benson and Elizabeth Schaefer, Energy and Power. Institute for Ecological Policies, Fairfax, VA, 1980.

6. Energy Advisory Board, Vermont Energy Advisory Board Report. Office of the Lieutenant Governor, Montpelier, VT. 1979

7. Northampton Mayor's Office, Button-Up Northampton: A 3-Part Energy Saving Program. City of Northampton, Massachusetts, .982.

8. Richard Greenfield, Brighton Energy Study. Northeast Kingdom Community Action, Brighton, Vermont, 1981.

9. John Warshow, "The Development of Small-Scale Hydroelectric Power Facilities in Vermont .. A New Perspective." U.S. Department of Energy, Region 1, July, 1980.

10. Rob Howland, Vermont Hydroelectric Development Handbook, Public Service Board, Montpelier, Vermont, 1980.

11. Kim Ke11ington, Solar Commercialization in Addison County, Vermont. Addison County Regional Planning & Development Commission, Middlebury, Vermont, 1979-1980.

12. Vermont Statutes Annotated, Vermont Municipal and Regional Planning and Development Act. Agency of Development and Community Affairs, Montpelier, Vermont (as amended through the 1981 adiourned legislative session).

13. Mike Zahner, Central Vermont Regional Energy Plan. Central Vermont Regional Planning Commission, Montpelier, Vermont, May, 1982.

A LOCAL ENERGY PROJECT HANDBOOK

TWO FINANCIAL POLICIES FOR ENERGY-RELATED INVESTMENTS

As energy costs continue to consume an increasingly larger share of town budgets, expenditures for energy-related investments will require greater scrutiny. Investment decisions for weatherization measures in town buildings, and energy efficient vehicles, furnaces, street lighting, and equipment should use financial policies which include the full cost of energy over the useful life of the project. Two such financial policies are the simple payback period (SPp) and life cycle costing (LCC). The SPP is an excellent tool for ranking proposed energy conservation measures in buildings. The LCC is a useful tool in evaluating the purchase of an item which actually uses energy to operate, i.e., a vehicle or furnace.

Simple Payback Period (SPp)

1 SPP is the amount of time it will take for an investment to pay for itself. More specifically, the result of a SPP calculation is the length of time, in years, required for an investment to yield savings that will repay the original cost of the investment. Before calculating the SPP, you should have the following information:

1. The initial cost of the project, including all design and installation costs.
2. The estimated annual savings that will result from the project, based on the dollar cost of the fuel you will save.
3. The estimated life of the project.

To calculate the SPP, simply divide the initial cost by the annual savings:

$$\frac{\text{Initial Cost (\$)}}{\text{Annual Savings (\$/yr)}} = \text{SPP (years)}$$

Notice that the SPP result will be the number of years it will take for a project to pay for itself. Now compare the SPP with the estimated life of the project. If the SPP is shorter than the project life, then the project is a worthwhile investment. In fact, the shorter the payback period when compared to the lifetime of the project, the more savings you will achieve above and

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beyond your investment! Disregard any project that will not pay for itself during its lifetime -- it would be a poor investment.

You may want to compare the SPP of each energy project to a standard limit you use for all your projects. Many institutions, like many businesses, have established such a limit in terms of an acceptable maximum for the number of years to payback. They do this in order to lower the risk on their investment (e.g., if an improvement wears out prematurely) and to maximize savings achieved beyond recovery of the investment cost.

By calculating the SPP for each of the projects on your list, you can make an initial ranking of projects in order of the time that each will recover its cost, with the shortest SPP receiving the highest priority.

For example:

In a Fall River building of 17,000 sq. ft., consideration was given to installing storm windows and wall insulation. The storm windows would cost $2,000 and would save about $425 each year for a period of twenty years. The wall insulation would cost $13,350 to install, while saving about $2,400 each year also for a period of twenty years. The payback period for each would be:

Storm windows: $2,900/$425 = 6.8 years

Wall insulation: $13,350/$2,400 = 5.5 years

The maximum acceptable payback period for projects for this building is 8 years; both projects, therefore, fall within this limit.

The insulation would recover its cost more quickly, and initially might be ranked first. However, there might be another factor to consider: the availability of funds for capital improvements. There could be constraints which make it difficult to allocate or raise a sum as large as $13,000 and therefore the $3,000 project might be a more realistic first choice.

You could have several projects with the same payback period and about the same cost to implement. In that case, select the one that would provide the greatest savings beyond the recovery of its initial cost.

SPp does not show the whole picture; it does not take into account the following factors:

escalating fuel prices;

- the cost of maintaining the project over time, such as operating labor costs, repair work and the cost of materials needed to keep the project in good operating condition;

- the rate of depreciation and the "scrap value", if any, of the equipment installed;

  the "discount rate". The discount rate compensates for the price that you must pay for raising the money you wish to invest. It may be the same as the interest rate you pay on a capital investment loan from a bank, or the interest that must be paid on a municipal bond issued to raise the money. If there is money in your budget, the discount rate is considered as the rate of return on an investment you might have made but didn't because you selected to invest instead in your energy conservation project (this investment would be your "next best alternative" for investing your money; you may have heard of it as an "opportunity cost").

- the rate of inflation, which erodes the value of your investment dollar. One way inflation would affect your energy project is to boost the cost of a capital improvement if you chose to delay it. For instance, delaying the purchase of a $4,000 boiler until next year might mean that the same boiler would cost 12% more next year, or $4,480. This inflationary cost increase would more than offset any interest you would have earned from another financial investment. Another way inflation enters the picture is by increasing the future operating labor costs and the cost of maintenance supplies and materials for an energy conservation project that you do invest in.

Payback Periods DO Change Over Time

See how fuel price increases and the rate of inflation can change payback periods:

In 1976 the Lakeview School estimated the cost for installing roof insulation to be $12,900. They were paying $.35/gallon for #2 oil. The simple payback on the project was $12,900/$1,400 = 9.2 years.

In 1979 the same project would cost about $16,700, assuming an inflation rate of 9% for materials and labor and $.95 as the price for a gallon of #2 oil during 1979-80. The simple payback would be $16,700/$4,030 = 4.1 years.

In only three years, the payback period had been more than cut in half.

There are several techniques for financial analysis that are more sophisticated than SPP; all of these include the concept of the "time value of money". Among the more complex techniques are: net present value, internal rate of return, benefit-cost analysis, and life-cycle costing.

Using these methods will indeed provide more accurate information about your investment options, but you may wonder if your final decisions based on SPP would change. In general, but not always, the priorities for potential projects established using the simple payback period method will not change. This is because the other factors not accounted for in SPP will be taken into account "across the board" for all of your projects. In other words, including the discount rate and the rate of fuel price increases will affect all your SPP evaluations in a similar manner: whether you install storm windows or wall insulation, your discount rate will be the same, as will the rise in fuel costs (and the resulting fuel cost savings). Simple payback is an acceptable method of analyzing potential capital investments, even though it does not account for the factors discussed above; most of these would not affect the ranking of your projects even if they were taken into account.

Life Cycle Costing

2 Decisions regarding capital expenditures are often determined by purchase price alone. The actual cost of a particular item can be far greater than the initial purchase price, particularly in times of double-digit inflation and spiraling energy costs.

LCC can be used whenever there is a choice among similar products which differ in useful life expectancy, initial cost and/or operating costs. A very simple example of LCC is demonstrated by the purchase of a pair of shoes. A consumer may consider one pair costing $30 with an expected "life span" of two years, and a second pair costing $45 which is expected to last five years. The simple yearly cost for the first pair of shoes is $15, while the second pair costs only $9 per year. If the consumer can afford the higher initial cost, he will receive the best value over the long term. Most cost-conscious consumers use this kind of decision-making process automatically when choosing among similar products.

With higher initial cost and longer life expectancy, more detail should be considered in LCC. The longer the life expectancy, the more important operating and maintenance costs become in relation to initial cost. Energy intensiveness (i.e., the amount of energy used) is technically an operating cost, However, the rapid increase in the cost of energy over the past ten years has proven to be so important a factor that energy should be considered separately. For some items, such as air conditioners, energy is so important it may outweigh the other factors when all costs are considered.

2Reproduced from a publication entitled "Local Government Energy Manual: Volume III, Procurement Practices and Life Cycle Costing". Prepared by Treasure Coast Regional Planning Council, Stuart Florida. Used with permission from the authors.

The relative importance of three of these factors, initial cost, operating efficiency, and energy intensiveness, can be demonstrated in the purchase of an automobile. In this example, the purchaser has enough money to purchase anyone of three cars, all of which satisfy purchase requirements. Life expectancy is not a factor since each vehicle is expected to last four years and 88,000 miles. Assume the following:

	Car A	Car B	Car C
Purchase Price	$4,500	$5,345	$5,500
MPG	18	24	28
Miles Between Service	8,000	12,000	15,000
Salvage Value (trade)	250	325	500

Additional assumptions:

1. The car will be driven 22,000 miles each year for four years; at the end of four years the car will be traded in.

2. Gasoline costs $1.20 per gallon.

3. Servicing costs $85 per visit.

Using initial cost only, Car A is the best buy because its purchase price is $845 less than Car BOs, and $1,000 less than Car Cos.

Next, we include the efficiency factor in the analysis. Product efficiency includes the operating and maintenance costs. The operating and maintenance (0 & M) costs in this example only include the cost of servicing. Other potential 0 & M costs, such as oil, tires, insurance, etc., have been excluded from this example for simplicity's sake. Any and all expected expenses may be considered in the initial analysis, depending on the level of accuracy desired. Adding the 0 & M costs to the initial cost yields:

	Car A	Car B	Car C
Purchase Price	$4,500	$5,345	$5,500
0 & M Costs	935	595	510
Subtotal	5,435	$5,940	$6,010
Difference	-0-	505	575

The formula used to obtain the above 0 & M costs is:

$$\frac{\text{Total Miles}}{\text{Miles Between Servicing}} = \#\ \text{servicing visits} \times \text{cost of servicing} = 0\ \&\ M\ \text{costs}$$

Now that we have the 0 & M costs, the energy intensiveness of the three

vehicles will be considered to determine what effect fuel cost will have on the overall cost of the vehicles. Adding fuel cost to the initial and efficiency costs yields:

	Car A	Car B	Car C
Purchase + O&M	$5,435	$5,940	$6,010
Fuel Cost	5,867	4,400	3,771
Subtotal	$11,302	$10,340	$9,781
Difference	1,521	559	-0-

The formula used to obtain the above fuel cost is:

$$\frac{\text{Total Miles}}{\text{Miles Per Gallon}} \times \text{cost of gasoline} = \text{fuel cost}$$

Through the use of LCC techniques, Car C now appears to be the least expensive to own and operate over the four-year useful life period. Even though its initial cost was the highest of the three, Car Cos lifetime costs are $1,521 less than Car AOs and $559 less than Car BOs. Deducting the salvage value of the vehicles, the difference in costs between Car C and Car A increases to $1,771, and the difference between Car C and Car B increases to $734.

	Car A	Car B	Car C
Purchase Price + O&M and Fuel costs	$11,302	$10,340	$9,781
Deduct Trade l.n	250	325	500
Total	$11,052	$10,015	$9,281
Difference	1,771	734	-0-

Car A, with the lowest initial cost, proved to be the most expensive to own and operate over the four-year period, basically because it is the most energy intensive and gasoline is so expensive. Car C, with the highest initial cost, is actually the least expensive largely because it has the best gas mileage of the three vehicles. Without using LCC, the effect of energy costs on the overall cost of these vehicles would not have been readily apparent.

Factors such as escalating fuel prices, discount rate, and inflation can also be included in a life cycle costing analysis to produce more accurate information about your investment options. For more information, please refer to the references.

References

1. Brown, Robert J. and Rudolph R. Yanuck. 1980. Life Cycle Costing: A Practical Guide for Energy Managers. Fairmont Press, Atlanta.

2. A Guide to Reducing Energy Use Budget Costs

3. Wilcox, Alan L. Energy Efficient Purchasing: Saving Energy and Money. State Energy Office, Montpelier.

4. Portland, Oregon. Life Cycle Costing and Portland Purchasing. Portland Energy Conservation Project. Policy Section of Bureau of Planning. May, 1977.

5. Massachusetts Office of Energy Resources. "Energy Management in Schools: Making Capital Investments, Implementing and Monitoring Your Program. 1979.

6. Local Government Energy Manual: Volume III, Procurement Policies and Life Cycle Costing. Prepared by Treasure Coast Regional Planning Council, P.O. Box 2395, Stuart, Florida 33494.

FINANCING ENERGY CONSERVATION AND RENEWABLE ENERGY MEASURES IN TOWN BUILDINGS

Introduction

A variety of financing options are available for implementing energy conservation and renewable energy measures in town buildings. Choosing the appropriate financing approach requires developing a strategy which follows a logical progression that builds upon previous successes, and which integrate the views of the selectmen and townspeople into its decision-making process. Towns can finance energy conservation and renewable energy measures through the following approaches:

- Town's discretionary funds
- Budget item
- Item on the Town Warning
- Leasing arrangements

Each financing approach has its advantages and conditions under which it is most appropriate, but the final choice depends upon the particular circumstances in each town.

Preliminary Steps

Before considering the actual financing of energy conservation measures (ECM's) and renewable energy measures (REM's), there are several important steps.

Note: All financing options presented here are appropriate for schools. Schools are also eligible for federal grant money through the Title III program and 30% state aid.

1. Energy Use Assessment - Assessing energy use in each town building will help identify where and how energy is being used, and energy use figures can serve as a basis for comparison after measures have been undertaken. Data can be collected from utility bills at the town clerk's office. Accounting for energy use in each building on a monthly basis would give a more accurate and immediate picture of the effectiveness of ECM's and REM's.

2. Walk-Through Energy Audit - A walk-through audit by knowledgeable members of the community can help identify simple measures which cost little to implement, but yield substantial savings.

3. Professional Energy Audit - A Home Energy Audit Team (H.E.A.T.) auditor will conduct free energy audits of your town buildings to assess the energy needs of an existing structure, operational and maintenance procedural changes, and specific ECM's to improve building efficiency.

These three steps serve as the building blocks from which to request monies for undertaking energy conservation and renewable energy measures. Before actually undertaking any major ECM's or REM's, it is highly recommended to have a Technical Assistant report done. Conducted by a licensed professional engineer or registered architect, this analysis can provide information on a building's energy saving potential, specific costs, projected energy savings, and payback calculations. As an example, the Technical Assistance report can provide information about a building's structural ability to hold an increased snow load due to added insulation. However, unlike the H.E.A.T. audit, such reports are not free, and usually run in thousands of dollars. Your H.E.A.T. auditor can help determine if a particular building would need a technical Assistance report.

Discretionary Funds

Most towns have a budget line item called Building Repairs/Improvements. Monies appropriated out of the Building Repairs/Improvement fund are done so at the Selectmen's discretion. This fund is an excellent source of financing when first approaching energy conservation in town buildings. Energy conservation measures which are relatively inexpensive and have short payback periods, such as weatherstripping and caulking, can serve as successful examples when requesting monies for larger projects with longer payback periods. The benefits of low-cost weatherization measures should be well understood by the Selectmen. Nevertheless, in your request to the Selectmen, documenbed information about their benefits would be helpful, along with figures and charts on the increased budget demands of energy costs since 1973.

Budget Item

Probably the most common approach to financing major energy conservation and renewable energy measures in town buildings is through a line item on the town budget. Budgets serve as a way of communicating to the selectmen and residents information about the types of resources to be purchased and the activities and objectives to be accomplished with public monies. Each town prepares a yearly budget which is approved at Town Meeting Day. (In larger cities, the budget process differs.) Every organization and government department interested in obtaining funds makes their request for the upcoming year to the budget committee. (In many towns, the Selectmen are the budget

committee.) An effective presentation to the selectmen should include the results of the H.E.A.T. audit, energy use assessment data, and the impacts of previously implemented ECM's.

The budget item approach infers an incremental approach to financing. An incremental approach is in contrast to a lump sum approach, such as a bond issue, which is described further on. As an example, assume your town is receptive to financing ECM'S and REM's as a budget item. If a Technical Assistance report reveals the need to spend $100,000 for measures with, let's say, a six-year payback period or less, it is highly unlikely that your town would be willing to spend all that money out of general revenues in any given year. It is more likely they would be willing to spend $20,000 each year for a period of 5 years.

Some towns already have a mechanism for planning yearly capital expenditures called a Capital Improvements Plan. A Capital Improvements Plan helps in the spacing of major capital expenditures and usually includes a list of proposed acquisitions and projects, the cost and timing of each project for each year of the plan, and the method of financing. Of course, ECM'sand REM's can still be financed as a budget item without a Capital Improvements Plan. The Plan puts future expenditures in writing.

A commitment for expenditures beyond the present year is helpful, but not essential. Your town may want to see the results of the first year's measures before committing or promising funds for future years. As previously mentioned, this is where some type of regular energy use assessment would be helpful. Figures which show significant reductions in energy consumption speak for themselves.

An Item for Town Warning

Financing ECM's and REM's through a separate issue on the town warning is appropriate for bond issues and for projects requiring special comment.

Bond Issue

If the cost of recommended ECM's and REM's is substantial, a bond issue may be appropriate. There are generally two types of bonds: general obligation and revenue. ECM's are usually financed through a general obligation bond which is the traditional bond vehicle and is paid for in yearly increments out of general revenues. For energy-related investments, revenue bonds are most appropriate for financing municipal power facilities,

Le., hydro facilities, whereby the funds are repaid from the sales on the power.

Interest paid to bond holders on municipal bonds is tax-exempt, and therefore, towns can offer interest rates 4%-5% lower than the going market rate. This might make it possible for towns to undertake projects which might otherwise be economically unfeasible.

Bonds can be quite a profitable financial option for towns depending upon the expected net energy savings. If the annual expected energy savings exceeds the annual debt service of the bond, this results in a favorable cash flow for the town. Selecting a set of measures with a payback period that exceeds the debt service of the bond will mean a net gain for the town.

When deciding upon whether to finance ECM's and REM's through a bond issue, several factors should be considered:

1. How receptive is the town toward indebtedness? Public forums and meetings can be held to explain the proposed bond issue and to gain a feeling of the residents' receptiveness toward a bond issue.

2. Bond issues can be a long process and may not be appropriate for projects whose immediate implementation may be imperative.

3. Energy conservation is not the only issue facing the town. Other needs may require a bond and thus reduce the support for an energy conservation bond.

4. When choosing the terms of the bond <interest rate and length of payment period) a positive cash flow will make the issue more attractive.

5. The bonding market for many small towns may be limited.

Even though your town may be receptive to a bond issue, it is important to check the support for such an issue in the financial community. The interest rate for a municipal bond is dependent upon the general debt of the town government compared to it's available revenues and total property values. In addition, check the debt restriction placed on your town, which limits the amount of money a town can borrow.

Projects Requiring Special Comment

This topic heading is meant to cover a wide range of possibilities. Each town will have its own reason for choosing to finance ECM's and REM's as a

separate item on the town warning. For instance, the Town of Middlebury had a $31,000 surplus from fiscal year 1979 and put the request for spending the money on energy conservation as a separate item on the warning. Another example might involve a reluctance on the part of the selectmen to approve financing of an ECM project as a budget item, so they may wish to put it before the town as a whole.

Leasing Arrangements

For certain types of investments, leasing energy equipment, such as electrical load management systems, may be the preferable financing approach. Leasing reduces the upfront cash demands of your town government, and can spread the cost of leased equipment over several years. There are generally two types of leasing arrangements a town can make: straight operating lease, and lease/purchase. Both types of arrangements involve the town government entering into an agreement with a leasing firm and agreeing to pay a rental fee for the equipment over a mutually agreed upon period of time. With a straight lease, the leasing company retains ownership of the equipment at the end of the time period, and the town acquires no equity. Lease/purchase arrangements are generally more favorable and appropriate for energy equipment. This type arrangement can be thought of more as a conditional sale or financing lease. The leasing company acts much like a bank in financing the cost of the equipment. The town is exempt from paying tax on the interest portion of the lease payment, however, the interest rate is usually a few percentage points above the rate for municipal bonds.

As with municipal bonds. depending upon the specifics of the leasing arrangement, the energy savings can pay for the lease payments. Also, this method of financing can act as a hedge against inflation. Essentially, the town is buying at today's prices and paying for it with tommorrow's dollars. Leasing arrangements allow for the funding of small capital projects where a bond issue may be inappropriate.

Before deciding upon entering into a leasing arrangement:

1. Review local and state laws regarding types of equipment that can be leased by a town government.

2. Prepare a preliminary cost comparison to other financing methods.

References

1. Financing Energy Conservation in Your Municipal Buildings. Massachusetts Executive Office of Energy Resources, 73 Tremont St., Boston, MA 02408.

2. Innovative Energy Finance for Local Government. New England Innovations Group, Inc., 128 N. Main St., Providence, RI 02903.

3. Town of Middlebury, Ms. Betty Wheeler, Assistant to Town Manager, Middlebury, Vermont.

4. State Energy Office, Title III grants

Community Button-Up Project

Introduction

A Community Button-Up Project (CBUP) is a locally designed and administered community energy conservation program. The scope of the project may vary within each community, depending upon local resources, leadership, and creativity. The major goal of a CBUP is to educate and mobilize a significant number of citizens to undertake low-cost conservation measures in their homes. This can be achieved through:

A massive publicity and outreach effort.

- Hands-on workshops.

_ Volunteer assistance to carry out conservation measures in the homes of elderly and disabled who are unable to do the work themselves.

A CBUP usually occurs during a concentrated 2-3 month effort: often in the fall as people prepare for the winter. Keeping the program simple and clear are the keys to success. The main focus of a CBUP should be clearly evident and easy to understand in all publicity, outreach, and activities of the project. A CEP can help build a local constituency of leadership and residents to address more comprehensive energy problems and needs over the long term.

In Vermont, Button-Up began in October, 1981, when the State Button-Up Committee, comprised of state, regional, and local officials, and led by the Community Action Agencies, organized activities in more than 50 communities. The state committee can provide your community with a publication on no-cost/low-cost ways to save energy and money (see reference), a newsletter with a calendar of events, a list of suggested. activities, and promotional materials. The Committee hopes to continue its efforts in upcoming years. Contact the State Energy Office for further information.

A low cost/no cost CEP revolves around promoting a series of workshops designed to cover the following topics:

conservation measures which involve only minor lifestyle adjustments and no money;

areas in the home with air leakage;

the installation of materials to block air leakage.

Air leakage can be effectively reduced through the use of materials which pay for themselves in one heating season, and can be easily installed in a few hours by the individual. As an illustration of the potential impact, the town

of Fitchburg, Mass. conducted a low cost/no cost CBUP, and reached 30% of the households. Each household reduced energy consumption an average of almost 15%.

Planning Steps

The following are a series of chronologically ordered steps designed to get a CBUP in gear.

1. Introduce the CBUP to community leadership -- conduct a series of informational sessions to call upon the support of a range of organizations, including local government, business and financial institutions, neighborhood groups, social service agencies, the private voluntary sector, and educational institutions.

2. Establish a planning/organizational committee -- include as many representatives of the community as possible. The committee may be responsible for preliminary planning and mobilization of resources and may evolve into a working group of project coordinators or as an advisory board to the project staff.

3. Identify goals and objectives -- the committee should discuss how these can be achieved in the community.

4. Establish and announce project identity -- devise an acronym to give the CBUP a clear identity. Enlist the services of a graphic artist from a college or high school art department. Also, obtain a headquarters in a local storefront. This might possible be donated as an in-kind contribution from a local business.

5. Make preliminary plans -- over a period of a couple of months, the committee should build up necessary staff and support to carry out the effort. Special attention should be given to

   a. Timing - implement campaign when citizens are most likely to be interested in reducing energy bills;

   b. Facilities - locate workshops and other necessary facilities in accessible, highly visible, areas of the community;

   c. Resources start efforts to raise cash, in-kind contributions, and expertise from within the community.

6. Divide up tasks for planning in detail. The committee may be divided into sub-committees to complete the day-to-day and long range tasks.

7. Recruit and train volunteers. Once the project tasks and needs are identified, begin an aggressive and well-organized recruitment of citizens to volunteer for a range of identified tasks. Use a system to record information on each volunteer, find out his/her

special abilities. and training needs. A series of training sessions should be held for volunteers featuring an orientation to the CBUP. and skills training in the specified task.

8. Announce the CBUP with a big splash. Use full media coverage. and explain how each citizen can participate and save money.

Who to Contact

Community civic and service organizations -- These groups are a key element in reaching the community. They should be kept in constant touch about outreach activities. Their involvement not only facilitates the outreach effort. but increases the number of people involved in the process. Various members of the committee can be responsible for attending community organization meetings. giving the update on the committee's activities. distribute information. and solicit help. Contacts might be established within each organization to facilitate information exchange. The greater the number of people involved in the process. the greater the chance for the success of the program.

Students -- Primary school children can carry fillers home to encourage more people to attend CBUP workshops and take conservation steps. Poster contests serve as a great tool for getting the students excited about conservation. Educational packets are available through the energy office. and teachers can coincide a few discussions with timing of the program. Secondary. college and vocational/technical students are valuable sources of volunteers in outreach and work crew assistance. The higher education institutions can provide people specializing in areas which can be helpful to the CBUP. A faculty member of the desired topic area should be contacted. The faculty member may be able to provide course credits or partial credit toward a course for students participation in outreach. administration. conducting workshops, and evaluation.

Private business -- support from the business community is crucial for fundraising, discounts. and contributions. Hardware stores can be approached for a 10-20% discount on weatherization materials. Large employers may give time off to attend workshops held at the place of business. businesses can be approached for storefront space during the intensified outreach effort. The Chamber of commerce should be approached at the onset of the project, and asked for advise, assistance. and contacts.

Utilities can provide fillers on monthly bills to promote the project. Any conservation programs undertaken by the utility should be published.

Elected officials and local leaders such as state representatives selectmen, and leading community figures, can do much to promote and lead public events for a CBUP.

Regional Planning Commissions Their experience in general planning procedures is invaluable.

- State Energy Office the Energy Office has access to a wide range of resources, materials, and expertise.

- Extension Service -- The UVM Extension Service has a branch called the Home Energy Audit Team (H.E.A.T.), administered jointly with the Energy Office. Their personnel are well experienced in home energy weatherization measures, in addition to the wide variety of help available from the other personnel.

- Department of Health and Human Services Ask about the benefits available for the fuel assistance program.

Publicity and Outreach

Weekly newscolumn -- the initiation of a weekly column in the local paper about energy conservation, renewable energy, and the activities of the CBUP is extremely useful as an educational tool, and as a means of communication to the public. The column should appear the same day of the week, in the same section of the paper, and should run a duration of 2-3 months.

Radio and T.V. -- a similar program as described in the newscolumn might be developed for a local radio or T.V. station. Upcoming events can be aired as Public Service Announcements over several stations.

Energy Fairs -- energy fairs have served as culminating or introductory events to an outreach program such as a low cost/no cost CBUP. They can include displays about conservation and renewables, a non-fossil fuel parade, music, games, skits, and food.

Miscellaneous -- church and civic bulletins, posters in schools and throughout the town, and leaflets can also serve as effective means for spreading the word about the outreach effort.

Workshops

Workshops can range in time from 45-90 minutes, depending on the amount of material that is covered. Handbooks can be distributed at the beginning of the workshop, and participants can use this as a guide throughout the session. Numerous workshops covering the same information should be given to avoid personal time conflicts and help assure effective, small sized sessions. A H.E.A.T. member is ideal for conducting the workshops. The presentation should allow plenty of time for questions, hands-on experience for a few individuals in the audience, and as many visual aids and demonstrations as possible.

Weatherization Display

The development of a display would serve the dual purpose of publicity and as a practical demonstration of how and where to install materials. Any public building frequented by the community would serve the purpose well, i.e., the library, town hall, or post office. An area of the building can be sectioned off as the display area. Weatherstripping and caulking in a window and door can be installed, and/or a model house can be constructed to show key places for the installation of weatherization materials. The model home can be built by a high school industrial arts class as a semester project.

Monitoring Selected Homes

Specific homes can be chosen throughout the community to assess their energy usage before and after the installation of the materials. The comparison can be used as local evidence that the conservation measures actually do save energy. People respond well to tangible evidence presented by individuals in the community they know. A sample size should be based on the statistically significant number of people in the community.

References

1. Community Energy Projects, Office of Voluntary Citizen Participation, Room 204, ACTION, 806 Connecticut Ave., NW, Washington, D.C. 20525.

2. Button-Up Vermont: No CostiLow Cost Ways to Save Energy and Money. Prepared by the Memphremagog Group. Available through the State Energy Office, State Office Building, Montpelier, Vermont, or call 1-800-642-3281.

Volunteer Weatherization Crews

Introduction

Volunteer weatherization crews fulfill the important task of conducting mini-energy audits and installing low cost weatherization materials in the homes of residents unable to do so themselves, such as the elderly and disabled. The crews are composed of local community volunteers ranging in age from senior citizens to high school youths. This program fits in extremely well with the Community Button-up Project, and both programs have been conducted simultaneously in other towns.

Planning Steps

1. Form a committee to oversee the operation of the program. The committee can be composed of a cross representation of the community, including local leaders, senior citizens, and youths. The South Royalston, Mass. program utilized the woman leaders from different segments of the community, with varying ages.

2. Develop or obtain a list of elders. Lists can be obtained from the town Grand List, senior meal site programs, Community Action Agencies, or put together by questioning fellow community members.

3. Contact each elder. Identify those elders who qualify for crew assistance (physical limitations), those in most pressing need of assistance, and those who qualify for possible weatherization materials.

4. Arrange visit of a volunteer auditor. A fellow senior or friend of the senior to be audited should accompany the auditor.

5. Schedule work crews. If possible, arrange for a friend of the senior to be on the work crew. Also, explore the possibility of the elder providing coffee and a snack to the work crew.

Role of the Committee

The committee not only serves as the chief organizer, but its duties include the crucial role of reaching out to the elders, making personal contact, and establishing a sense of trust. The committee is also responsible for arranging:

- possible grants for expenses and weatherization materials;
- recruitment of volunteers to conduct audits, install materials, and make contacts with seniors;
- training sessions for volunteers;
- time schedule, transportation, and tools for audits and installation of materials.

Again, crucial to the success of the program is establishing a sense of trust with the elders. Committee members can personally take on the role of contacting elders, or can delegate the role to volunteers. In either case, the committee member should maintain ultimate responsibility.

Organization of the Crews

Crews can be composed of all segments of the community. As previously mentioned, a friend or neighbor should accompany a crew if possible. The designation of certain people as crew leaders is important for accountability of proper workmanship and for overall responsibility. The following is a description of one type of possible work crew, composed mainly of local youths.

Youth volunteers can come from high school classes (especially industrial arts), local youth groups (i.e., YCC, church groups) and other civic organizations. The degree of commitment is the single most important factor in the success of the program. School credits can be given to participating youths in exchange for a certain number of hours each week devoted to the program. Their involvement could include a full write-up on each house detailing where energy loss occurs, how to stop the loss, pricing the materials, and a full cost evaluation. The process involves a fair amount of time per house, but also gives the youths practical experience in the business world. If the objective was to weatherize as many homes as possible in a short amount of time, an abbreviated program could be developed involving less of a time commitment per house.

A Board of Directors could be formed among the youths to make organizational decisions. The Board would determine the group's direction, administrative matters, and general problems and questions. By structuring the organization as youth directed, this not only develops leaders within the community, but also assures greater success by assigning the responsibility to themselves for the group's direction. The adult members could serve as advisors.

Training of Volunteers

Training for conducting mini-audits and the installation of materials can be undertaken by the Home Energy Audit Team (H.E.A.T.) of the Vermont Extension Service, or by other local energy people. Post hands-on training experience can be undertaken in town buildings, meeting halls, and churches.

Techniques in Approaching the Elderly

The South Royalston, Mass. committee found the single most effective technique in getting elders to participate was "word-of-mouth": a pleased elder could get a friend to take advantage of the service.

Confidentiality provided by the outreach and committee members was found to be extremely important. Attitudes which were often encountered in the elders were: fear of being known as accepting aid, fear of strangers entering their homes, not wanting to deal with the inconvenience of a government program (funding for materials was provided by the government), and fear of being humiliated by rules. These attitudes often meant more communication was required between an interested elder and the outreach worker.

The following approaches and explanations were outlined by the South Royalston committee:

- Confidentiality would be guarded.
- Elders had a choice of dealing with an outreach worker they knew or someone they didn't know.
- The program was conducted by local people, not big government.
- Most of the houses in town were built in the days of cheap energy. Therefore, their house is not the only one in need of weatherization.

  Seniors could participate in the installation, or they could watch.
- Reciprocation -- elders would be provided the opportunity to return the favor; whether through a snack, child care, or contacting other seniors about the service.

Costs and Funding

There are some unavoidable costs associated with the program. Transportation, tools, and materials for installation are the main expenses. Office supplies such as paper, pens, envelopes, stamps, etc., will be necessary for correspondence and publicity. Participating elders can be asked to pick up a part or all of the cost of these materials, plus an added amount for expenses. Monies can also be obtained through fundraisers, an appropriation from the town, or through grants.

Benefits to the Community

Besides the direct monetary savings which each senior would realize, the related community benefits are also significant. These include: 1) the enduring cooperative spirit produced through people working together to help themselves; 2) the increased amount of understanding and empathy between younger people and the elderly when they work together on a common project.

References

1. Community Energy Project, Office of Voluntary Citizen Participation, ACTION, 806 Connecticut Ave., NW, Washington, D.C. 20525.

2. Millers River Center for Regional Self-Reliance, New Boston Road, South Royalston, Mass. 01331 (617-249-9222).

Community Insulation Project

Introduction

The Community Insulation Project encourages residents and businesses to obtain insulation contracting by taking advantage of group rates during the off-season. The success of the program depends on the degree of participation from the local community, institutions, and agencies. In Northampton, Massachusetts, the residents saved 20-25% of the cost of insulating attics, and recovered their costs of insulating within 1-2 years through reduced energy bills.

How the Program Can Work

Distribution of Program Information. A brief description of the program's benefits and requirements should be distributed to all building owners in the community. It will contain information on how to request a free home energy audit from the statewide HEAT/RCC program, as the first step to obtain the benefits of the program. Additional information which can be distributed at the same time can include: specifics on how the program works, the benefits of an audIt and of undertaking insulation, and participating institutions and agencies. The information can be distributed either by mail, through door-to-door dropoffs, and/or through the local newspaper(s).

The audit. H.E.A.T.lR.C.C. members will conduct free energy audits to help residents and businesses determine areas of heat loss and the need for energy conservation measures. On a return visit, they will write up the costs and specifications for installing energy conservation materials, such as insulation. Copies of the audit and specifications are mailed to the homeowner or business, who in turn should send a copy of the specifications to the project coordinator if they are interested in participating.

Bid process. The project coordinator compiles the audit forms every month (or any chosen time interval), and then makes the audits available for group bidding. A return date should be specified to announce awarding the bid. Bids are awarded to the low-bidding contractor. In larger sized towns, bids can be grouped by geographic area, and made available as separate bids.

Contracts. The H.E.A.T./R.C.C. have a list of approved contractors, and can manage the details of the contract.

The contract can contain the following requirements:

1. A guarantee for workmanship and materials over a given time period.
2. A clause which states "work must be completed without undue delay."
3. Deadlines for the commencement and completion of work.

4. Requirements that materials meet federal specifications, guaranteed by the contractor or manufacturer, and carry a label of an independent testing company.

5. Shrinkage limitations of 1% a year (or any chosen percentage) for sidewall work.

6. Inspection of work. If the contract specifications are arranged through the H.E.A.T•fRCC, the RCC will make inspections (for a small fee) to certify for completed work. The H.E.A.T.fRCC will inspect do-it-yourself work for free, and there is a waiver of the inspection fee for contractor installed work for low income households. Inspection is required before payment. RCC members can also act as the arbitrator for disputed work.

Who to Contact

1. Utilities -- Electric and gas utilities throughout the country have helped finance insulation for electrically and gas heated homes, either through low-interest loans or direct payment for a portion of the cost of the materials and installation. They may also contribute funds for operational costs of the program.

2. Lending Institutions -- Lending institutions throughout the country have offered low-interest loans for insulation. A reduced interest rate of only 3-4% can help reduce the payback period into an affordable investment. Banks can also contribute funds for operational and promotional costs. Homeowners can take their completed audits and cost estimates to the lending institution when applying for the loan.

3. Community organizations -- Local youth groups (Jaycees and Boy Scouts) can distribute information door-to-door. Arrangements can be made to give short presentations at community organization meetings to describe the program and its benefits. Organizational leader support and promotion can go far to improving the success of the program.

4. Elected officials -- Their support can come in the form of radio spots, introductions at meetings, or actual involvement in the layout of the program.

5. Other participants -- See "Community Button-Up Project".

Miscellaneous

For do-it-yourselfers, arrangements can be made with local hardware stores to provide insulation at reduced prices and a "How-to" manual made available.

The 15% Federal Tax Credit for weatherization materials should be prornoted.

The planning steps, formation of a planning/organizational committee, publicity, and outreach procedures, are reviewed in the "Community Button-Up Project."

Resources

1. Office of the Mayor
   City of Northampton
   City Hall - 210 Main St.
   Northampton, MA 10160

2. H.E.A.T./R.C.C.
   State Office Building
   120 State St.
   Montpelier, VT 05602
   Call toll-free number, 1-800-322-8888
   [Auditors are available by region.]

FUEL OIL COOPERATIVE

Introduction

A fuel oil cooperative is an arrangement among community members to purchase fuel oil at a lower price per gallon than the market price. Households can receive bulk rate discounts by buying in large quantities and/or buying from a given location which reduce the fuel oil dealer's delivery costs. Estimates on per gallon savings range between 4-9 cents. As an example, a household with an average fuel consumption of 1000 gallons a year with a discount of 6 cents/gallon can save $60 a year on fuel bills.

Planning Steps

1. Gather together a group of interested households. Hold a preliminary meeting to discuss the workings of a co-op and to exchange ideas about the direction and purpose of a fuel oil cooperative.

2. Talk to fuel oil dealers in the area, and discuss the potential for receiving a bulk rate on fuel oil.

3. Select a name for the co-op. Choose an address, perhaps design a letterhead and logo to give impression of a business-like organization. Choose a Board of Directors to handle administrative and negotiative tasks.

4. Send out bid proposals to fuel oil dealers.

5. Choose the dealer with the most attractive bid proposal. Considerations include quality of service, in addition to quantity of rebate.

Operational Details

Starting and operating a co-op costs money for supplies, advertising, postage, etc., let alone hours of volunteer time from dedicated individuals. These costs need to be recovered in some manner. Two such methods for recovering expenses are outlined below.

1. Proportion of fuel savings - The fuel oil dealer remits directly to the co-op a portion (e.g., $.02/gal) of the discount on purchase contracted for co-op members. This money would be deposited in various investment options, and the interest could be used to help cover co-op expenses. Members would then receive a rebate charge form the co-op in late spring or early summer based upon their oil purchases during the year. Co-op members would be billed by the dealer at the regular retail price. Members would use their oil receipts to help determine the amount of their rebate from the co-op. The oil supplier should provide a copy of each member's account at year end to determine amount of gallonage.

2. Membership dues - Co-op members can be charged a non-refundable annual dues ranging from $2.50 to $10.00 per household. Depending upon the total expenses of the co-op, this may be a sufficient amount to cover it. The co-op may be able to negotiate with the dealer to have members billed at the discounted amount.

3. Combination - Probably a combination of the two will be necessary, based on the experiences of other co-ops. In this case, members would be billed at the full retail price, and receive rebate checks from the co-op.

Arrangements with Fuel Oil Dealers

When deciding upon a dealer, ask about:

- Area served by the company
- Number of gallons it is capable of supplying area on a regular basis
- Minimum number of gallons needed to get a discount
- Bid price both as the current delivery price per gallon, and guaranteed price increment over and above the posted tank price. The price increment above the bid price is actually what shows the per gallon reduction the dealer is willing to offer. This increment should remain the same despite changing oil prices.
- Bid price at various levels of membership. For instance, at various membership levels, i.e., 10-25 households, 25-50 households, the dealer may offer increasing discounts with increasing membership size.
- Price and description of services for cleaning and maintenance of heating equipment, and for efficiency test and tune-ups. Bid proposals for these services should be considered separate and apart from fuel oil *bid* proposals.

Availability of monthly payment plan.

Policy on bad debts - ensure that the co-op is not liable.

- Possibility of finder's fee - whereby dealer offers a dollar incentive for each new customer, or higher cent/gallon rebate.
- Availability of computerized billing and printout, for use in co-op mailing of rebate checks to members.

When negotiating with dealers, the following items should be included:

- Estimated number of gallons used per household per heating season.

Combined with the various levels of membership, this gives the dealer the total number of gallon sales to bid on. (Number of households x estimated number of gallons per household = total number of gallons)

- Time period for which the contract would extend.

- Delivery shall be made to individual residences of the co-op members.

- Liability for payment of fuel supplied to members of the co-op is borne by each member. It should be clear that the co-op is not a purchasing/financing agent, but serves only as an agent to arrange bulk discount prices.

Co-op reserves right to increase membership.

- Co-op will request information from dealer on the number of co-op members and quantity of oil delivered.

- Delivery and billing will be the same for all customers.

Oil dealers may be willing to offer a bulk rate discount for the following reasons:

If residences are in a given location and deliveries can be coordinated, dealer can save on delivery costs.

- Gives the dealer an insured sector of the market.

- Dealer gets new customers (and thus increased revenues) without expending any time or money.

- Assured higher volume could mean better volume discounts from dealer's supplier.

Why a dealer might not be interested in offering a discount:

- If dealer receives complaints from long-time customers who resent co-op members getting price advantage.

- If dealers are in close contact with each other and are relatively satisfied with their share of the market.

- If co-op is opposed to having some members excluded from the co-op due to credit checks by oil dealer. Dealer may wish to run credit checks on all customers and wish to exclude certain members. The Ottawa Co-op allows their supplier to run credit checks and not supply any member they don't feel is credit worthy.

Incorporate or Not Incorporate

Your co-op may wish to become incorporated for the following reasons:

Gives appearance of professionalism and seriousness, and thus helps ensure respect of dealers, members, and public at large.

- Reduces liability of Directors, in case someone absconds with money.

Members would purchase one share each ($5.00 is an adequate amount), and this could essentially serve as their membership certificate to be redeemed if they should leave the co-op. Annual dues could still be collected.

Keys to a Successful Co-op

1. Dedication and hard work of a few people.
2. Operating in a business-like fashion. This does not necessarily mean efficiency above all else, but does mean an air of seriousness and professionalism.
3. A diversity of skills on the Board of Directors -- i.e., lawyers, business people, local organizers and a commitment to work together to advance the purposes of the co-op.
4. Keeping members informed through a newsletter about co-op activities, negotiations, and arrangements with oil dealers, information about rebate checks, energy conservation, ideas and proposals for the future, tasks which require volunteer help, and general education about the energy economy. Newsletters shuld be sent out 2-4 times/year.

References

1. Munjoy Hill Neighborhood Organization Fuel Buyers Club P.O. Box 8312 Portland, Maine 04101.
2. Queen City Energy Cooperative, 171 North Winooski Avenue, Burlington. Vermont, 05401.
3. Queen City Energy Cooperative, David Clavelle, Civil Defense Director, City Hall, Burlington, Vermont 05401.
4. The Co-op Way to Conservation: Ottawa Appropriate Home Energy Cooperative Community Energy Kit, P.O. Box 4234, Station "E", Ottawa, Canada, K1S 582.

Fuelwood Cooperative

Introduction

A fuelwood cooperative is any arrangement among community members to secure fuelwood at a price per cord lower than the market price. Cooperative members make a willing commitment to substitute personal labor in return for a lower price. The extent of the work commitment can range from coop members actually cutting trees from stumpage, or cutting and splitting tree lengths into stove lengths, or simply distributing stovewood purchased from a supplier.

Some of the key components include:

1. Democratic control -- Each member has equal voting power in all cooperative decisions.
2. Service at cost -- Coop members receive fuelwood at cost, plus minimum expenses.
3. Membership owned -- Each member owns an equal share of the coop regardless of finances.

The program described here refers to a specific arrangement where coop members receive uncut logs (varying lengths) from local loggers or fuelwood dealers, and then cut and split the logs to appropriate size.

Planning Steps

1. Form a core group, either in conjunction with an existing community organization, or alone, to do the groundwork. Seek out people with business skills, community organizing skills, forestry knowledge, etc.
2. Assess the characteristics of the market area:

    a. Current market structure - the availability of and demand for fuelwood in the area by type of supplies and type of user.

    b. Geographic size of the market.

    c. Needs and characteristics of wood-burning households.

3. Talk to the following people to help determine the viability of a coop:

    a. Firewood dealers

    b. Loggers

    c. Timber owners

    d. Foresters - County and private

    e. Agency of Community and Development Affairs·

    f. Community Action Agency

    g. Selectmen, town manager, town planner, etc.

    h. Church and civic leaders

4. To help determine the need for a coop, a fuelwood survey can be conducted. The following questions might be asked:

    a. Do you burn wood? How much?

    b. Would you be willing to exchange personal time and labor for lower cord wood prices?

    c. What percent of your heating requirements does wood fulfill?

    d. Do you have difficulty obtaining fuel wood at a price reasonable to you?

    e. Where do you get your wood?

    f. How much do you pay per cord?

    g. Are you satisfied with the quality of your wood?

    h. If you don't burn wood now, would or are you considering it for the future?

Before the first meeting is called, have a workable scheme with definable choices.

First Organizational Meeting

To attract members to the first "general discussion meeting", contact local newspapers and radio stations, put up posters in local stores, contact

Community Action Agency for the names of low income residents who might be interested, contact key officials and leaders, and spread the news by word of mouth.

The following are some topics for discussion:

1. Explain the concept of a cooperative, give examples of existing ones, and give an idea of what might be possible in your community.
2. What kind of function do you want a cooperative to serve in your community?
3. To what extent are coop members willing to secure fuelwood, i.e., from stumpage, or delivered logs?
4. What are the membership size limitations?
5. Who might be interested in joining?

Pass a sign-up list for prospective members. Also identify key people interested in participating in a Coop Planning Committee to take a comprehensive look at the proposed cooperative.

Set a time for the next general meeting to report the Coop Planning Committee's progress and other updates. The first meeting is not intended to seek out membership commitment, only to explain the proposal and interest possible members.

Role of Coop Planning Committee

1. Think through the day-to-day and long-run operations.
2. The committee can be broken into sub-committees:

   a. Financial operations estimates working capital requirements, identifies appropriate bookkeeping and accounting systems, prepares cash flow and income projections, identifies sources of start-up financing, consults with sources of business information and advice.

   b. Production planning -- facilities needed, cost of equipment and supplies, production goals, cost of operations, identification of potential contractors and suppliers.

   c. Management and personnel -- prepares profiles of the group leaders (prior experience, training and educational

backgrounds), job description, coop membership policy as it relates to production and equity, determine time commitment per cord, discuss the responsibilities of the coop coordinator and establish a list of possible candidates.

d. Publicity and fund raising - make co-op known in the area for clout and responsibility.

3. Prepare an operational plan to be put before the general membership.

General Operations

1. Cutting and splitting the wood can be done at different members houses or at a central delivery point. (Depends on the arrangement with the supplier.)

2. More than one person should always be present at anyone time during operations, for safety purposes.

3. Coop members get together on a regular basis. Saturdays are usually good times. Scheduling the proper number of people each week can be a problem, but can be overcome by proper planning.

4. A safety course on the proper use of chain saws, splitter, etc., is advisable for all members. Follow-up supervision is also recommended.

5. Equipment arrangements vary:

   a. Members strictly use their own. This helps to assure those using the equipment know its proper use.

   b. Members can share equipment.

   c. Coop can lease or own equipment; and certain members can be responsible for the use of certain equipment. Staff is responsible for maintenance.

Financial Aspects

Costs -- the Hardwick Coop receives a truckload of 6 cords for $250 at tree length. Members receive the wood at a cost of $42-$45 a cord. Figures will vary depending on the locality. Members of the Portland Wood Fuel Co-op pay about $80/cord of seasoned wood, which is about $30 less than the going

rate for seasoned wood.

Outside funding -- look for sources of seed money from financing institutions, community organizations and churches, local businesses. These monies can help cover the initial expenditure on the logs, and for equipment such as chain saws and splitter. Obtaining seed money can often be crucial to the success of a coop. Funding can be minimized if coop members, interested citizens, or local businesses donate the use of equipment.

Pooling funds -- coop members should each contribute initial monies for the purchase of the first load of wood.

Membership dues -- this can be anywhere from $5 or more, depending on what expenses wished to be covered. Collecting dues is an expression of commitment to the coop.

Fundraising -- to help offset the cost of wood, the coop can raffle a cord of wood with $100 worth of raffles. Other fundraising activities might include bake sales, dances, flea markets, and feast-outs.

Work Requirements

The Hardwick Coop and the Portland Coop have both determined 5 hours per cord to be a reasonable figure. Your own figures will depend on the particulars of the situation. Work duties do not necessarily require physical labor. Duties such as bookkeeping, organizing, scheduling, etc., also could be used to fulfill work requirements. A part-time paid staff person may be necessary depending upon the size of the coop.

Insurance

Members can sign release forms, but they have no assurance of avoiding a lawsuit in the case of injury. See local insurance agents for the possibility of providing group or individual personal injury liability policies.

Additional Activities

The coop may expand into the following activities:

1. Training sessions on heating with wood safely, utility rights, thermal window shades and shutters, and solar energy devices.
2. Group purchasing for woodstoves, stovepipe, insulation, solar equipment, etc.
3. Create a base to sustain ongoing political or social service goals.

4. Protecting and/or improving local forest resource base. To promote this, the co-op can expand to include producer-members (i.e., timberowners) as well as consumer-members (i.e., wood-burners).

Size

Membership size obviously varies from coop to coop. Ten to thirty households is usually a good working size to start with.

Incorporation

The Coos County Wood Co-op has found that by becoming a legal entity through incorporation, this gives the coop more credibility within the community and in its business dealings.

References

Vermont has two active coops. For more information contact:

Chris Holden
Wardsboro, Vermont

Northeast Kingdom Community Action
P.O. Box 68
St. Johnsbury, VT 05819
472-6260

New Hampshire has several active coops. To name a few:

Northern Carroll County Wood Co-op
Box 1874
Conway, NH 03818

Coos County Wood Coop
c/o Tri-County Community Action
Box 496
Berlin, NH 03570

Southern Carroll County Wood Coop
Box 173
West Ossipee, NH 03890

North Country Institute Energy Cooperative
Box 184
Woodsville, NH 03785

Other useful references:

1. Organizing and Managing a Consumer Wood Fuel Cooperative, MCC Associates, Inc., 8534 2nd Avenue, Suite 400, Silver Spring, Maryland. Prepared for Western Solar Utilization Network, 715 S.W. Morrison, Portland, Oregon 97205. 1981.

2. "Futures for Energy Cooperatives, U.S. Department of Energy, Assistant Secretary for Conservation and Solar Energy, Office of Commercialization. Washington, D.C. 20585. January, 1981. DOE/CS-0206.

3. National Consumer Cooperative Bank, 2001 S Street, N.W., Washington, D.C. 20009

4. "Wood Coops -- A New Way to Save Money on Fuel", Susan Osborn. Country Living, April/May, 1981.

5. Phil Krietner, New England Community Action Association, 141 Milk St., Boston, Massachusetts 02109. 617/426-9596.

6. Portland West Neighborhood Planning Council, 155 Brackett St., Portland, Maine 04102, Attn: Wood Co-op.

Use Value Tax Program and Forestland

Introduction

This state-wide program is designed to encourage the use of sound forest land and agricultural practices, and to ease developmental pressures caused by high property taxes. Landowners can choose to have their land appraised at use value (vs, fair market value, which is generally higher) in exchange for undertaking a management program for their woodlot or farmland.

Ninety percent of Vermont's forest land is privately owned, and these lands represent a valuable resource for recreation, wildlife, watershed protection, timber, and fuelwood production. In a 1981 survey of county and private foresters (Kelly), fuelwood was given as the number one objective for ownership by participants in the program. Proper forest management can help increase the availability of this resource.

In the first year (1980), a total of 501 parcels in 115 towns, or approximately 110,000 acres of forest land, had received use value appraisal. On the average, landowners realized a net saving of $3.38 per acre, or 70% of their taxes on the land.

The Use Value Tax Program has received a relatively slow response since its inception in January, 1980. Some problems the program has faced are:

1. Skepticism, confusion, and unawareness about the program and its benefits.
2. Questions about the cost of the application procedures vs. expected benefits.
3. Confusion about a town's common level of appraisal and benefits of joining the program.

These problems can be partially overcome through the promotion of an educational outreach program which includes workshops, public information, and demonstrations.

How the Use Value Tax Program Works

A landowner interested in .jom i ng the program must develop a 10 or 15 year management plan which is approved by the Vermont Department of Forests, Parks and Recreation. A private forester will categorize a parcel of land by site class, based upon soil potential and productivity of the land, and then the local assessor will determine the use value of the land, based upon the site classification. So that use value taxation does not result in revenue losses to the town, the state has a reimbursement fund to compensate towns for the loss.

Should a landowner develop a parcel of land already in the program, a penalty tax would be levied. This penalty tax is 10% of the fair market value of the developed portion of the land. The 10% is calculated at the time the parcel is withdrawn from the program. Development is defined as:

- use of improper cutting methods;
- use of logging roads for purposes other than logging;
- Subdivision of a parcel of land, when one or more parcels contains less than 25 acres;
- construction of building for other than logging or forestry purposes.

In order to secure payment of the penalty tax, a lien is attached to the property for perpetuity upon acceptance into the program.

Problems and Answers

A. Skepticism, confusion, and unawareness of the program

Local tax officials have expressed that the program cr-eates extra work and is too much trouble for themselves and landowners. They also view the program as a state intrusion into local municipal autonomy. Tax officials need to be worked with directly to clear up any misunderstandings about the program. A meeting with the tax official, county or private forester, Current Use Advisory Board representative, energy board member, and other related officials could be useful.

There is some confusion about the penalty tax and the perpetuity clause of the lien. By entering the program, the forestland owner gives up his/her right to do with the land as their needs demand. The penalty tax was developed to serve as a disincentive to land speculators. The land use change (penalty) tax is due upon development of land which has been appraised at use value, and constitutes a lien upon the property in perpetuity. However, some perspective program participants have been hesitant to enter the program due to family parcelling considerations. In the survey of foresters (Kelly), landowners said they held land for stewardship and multiple-use. Although participating landowners do generally not want to attach a lien due to their ownership goals, they are not bothered by it. According to the foresters, participants feel the lien is a small price to pay for the tax break. In regard to the parcelling of land, the land use change penalty tax is based only on the contributory value of the changed portion, not on the entire parcel. Also, the parcelling would have to be under 25 acres to be taxed..

The survey found few landowners knew of, or had a full understanding of the program. A high percentage of landowners who inquired about the program to foresters actually entered. However, it should be made clear that the program is not for everyone. A media based outreach program could go far to increase awareness and participation in the program.

B. Cost of the application procedure

The average Vermont forest landowner does not have the expertise to develop and prepare an acceptable management plan. Landowners must usually hire a private or county forester to survey and develop a professional management plan. These capital outlays come before the landowner has any assurance of the tax advantage and revenues from resource development. Participating landowners have found they can generally recover the costs of hiring a consultant within the first 2 years after entering the program based on the tax savings alone. The size of the parcel under consideration is also an important factor. The larger the parcel, the lower per acre charge for a management plan.

C. Confusion about common level of appraisal

In 1977, the legislature passed a law requlrlng appraisal at 100% of fair market value. Many towns have not been reappraised to reflect this level, and landowners living in towns with an appraisal value less than 100% of fair market value feei the program would be of little benefit to them.

When determining the total value of a parcel of land, the use value is multiplied by the common level of appraisal in the town. Therefore, landowners would receive the same tax advantage regardless of the common level of appraisal. However, some landowners may be discouraged from joining the program if they are already receiving an informal use evaluation which is lower than the common level of appraisal in the town. A mathematical example would be helpful to explain the relationship between land use value and the common level of appraisal.

If reappraisal does occur, the average small or medium landowner may not have the cash flow to offest the amount of the new tax. There can be a strong incentive for more intensive use. A reappraisal year would be an opportune time to promote the tax savings and benefits from management of the Use Value Tax Program.

General Recommendations

1. A pUblic information program should promote the commitment to long-term management, the tax savings potential, the benefits of proper forest land management, and should clear up confusion over rules of the program.

2. Pilot projects, demonstrations, and workshops for hands-on and

visual experience could be useful.

3. Media coverage helps to reach and develop more broad based support.

4. Landowners can be informed about federal programs which aid in developing access roads and land improvement.

5. Contact private foresters and jointly mail out letters explaining the advantages of the program.

6. Make available the names of private foresters (available from the Department of Parks and Forests).

Persons and Agencies to Contact

- County Forester

- Soil Conservation Service

- Extension Service

- Current Use Advisory Board, Waterbury

_ Department of Forests, Parks, and Recreation, Montpelier

References

1. The Use Value Tax Program and Forestland in Vermont. An evaluation and recommendations for improvement. Barbara J. Kelly. Sponsored by the Andrew Mellon Foundation, May, 1981.

2. Tax Stabilization/Current Use Advisory Board. Debbie Brighton, Waterbury, 241-3505.

3. Use Value Appraisal of agricultural and Forest Land in Vermont: A Citizens Guide. Cooperative Extension Service, University of Vermont, Burlington, Vermont.

TOWN FOREST MANAGEMENT

Introduction

There are about 121 town forests in Vermont, totalling 38,524 acres. Most town forests are under various levels of management by the Department of Forest, Parks, and Recreation. Some are used very intensively for multiple use and wood products, some for wood products only, some for watersheds, and some for recreation. However, many town forests could be managed more intensively to provide income to the town, increase the availability of fuelwood, increase wildlife habitat, provide environmental education, and for other resources. County foresters can conduct a preliminary inventory of your town forest, if one hasn't been done in the past, or in recent times. Due to a change in priorities and reduced budgets within the Department of FPR, many towns are retaining private foresters for management services. A private forester can manage the forest on a continual basis through the development of a long-term management plan.

Planning Steps

1. Gather together interested individuals and form a committee to examine the possibility of managing the town forest.

2. You may wish to conduct a survey to assess the needs of the town and the community to find out if:

    a. Residents are interested in having the town forest managed;

    b. If so, managed for what resources.

3. If your town has not had a preliminary inventory conducted in the past, or in recent years, contact the county forester.

4. Contact local fuelwood dealers to assess their receptiveness and ideas toward managing the town forest for fuelwood.

5. Show the selectmen: 1) survey results, 2) evaluation by the county forester, and 3) your recommendations for action.

County Forester

The County Forester is the key person in the scheme of things, historically,having worked very closely with the towns in acquiring municipal forestland and providing all phases of management assistance. Some of the first basic management decisions should be made with the County Forester providing the leadership. He/she can help in the selection of members for the Town Forest Committee and can serve as an ex-officio member. If a private forester is employed, the County Forester can provide valuable input regarding the decisions to manage the town forest.

Role of Private Forester

If the services of a private forester are employed, he/she should develop an updated long-term management plan which outlines (on a yearly basis) management by acreage and location, and expected cost and revenues. The plan should include an inventory of forest resources, and long-term production on a sustained yield basis.

A variety of responsibilities and financial arrangements can be made. In their fullest capacity, private foresters can act as agents for the town, send out bids to loggers, and handle all financial arrangements between the town and the logger.

In a lesser capacity, the private foresters function can be limited to preparing yearly specifications for management. In this case, the town would be responsible for arrangements with loggers and the financial aspects.

Arrangement with Logger

Most loggers work independently as purchasers, contractors, and sellers of wood. Financial arrangements can vary. For instance, sawlogs can be sold to the logger in a lump sum and fuelwood can be retained and sold by the town. In Fairlee, Vermont, loggers leave log length fuelwood by the roadside, and this is available to residents at a reduced rate. The desired arrangement can be negotiated and written into a contract. Arrangements should be done by a private or county forester, using a contract which outlines such items as: price for timber, wood, pulpwood, road building and placement, maintenance of roads, boundary work, insurance, and many other items covered in a contract.

Expected Fuelwood Yields

On previously undermanaged forestland, the initial cut can be substantial. Estimates for fuelwood are 5-10 cords/acre from the initial cut, and 1/2 to 1/3 cord/acre on a sustained yield basis. However, the range varies greatly depending on the tract of land.

Authority to Purchase Land for a Town Forest

Towns have the authority to vote sums of money for the purchase, management, and improvement of a town forest. Most towns already have some land holdings, and your town might consider consolidating its holdings to form a town forest by trading or selling with adjacent landowners. A trusteeship with an environmental organization is also another possibility, where the forest would be managed specifically for environmental education or wildlife.

Resources

1. Vermont Department of Forest, Parks, and Recreation - Agency of Environmental Conservation, Montpelier. This Department can provide technical assistance service through its county foresters,

a list of private foresters in your area.

2. UVM Extension Service -- Regional Offices. The Extension Service can also provide valuable technical assistance.

3. Margaret Watt, Fairlee, Vermont

Emergency Fuelwood Stockpile

Introduction

An emergency fuelwood stockpile can help mitigate the impacts of and provide short-term relief to elderly and disabled persons who run out of wood during the winter. These families may improperly plan for, or have insufficient financial resources to secure their total fuelwood requirements for the winter. Temporary shortages may occur during critical times. A stockpile could alleviate hardships until a supply can be found.

Planning Steps

1. Contact the local Community Action agency or other low-income advocacy agency. They are in contact with potentially needy families, and provide information on the need for such a program. A social service agency may also be willing to help in the program.

2. Use the media to promote the program.

Sources of Fuelwood

In Addison County, residents were asked to donate 10 chunks of wood for the stockpile. People were asked to call and make pledges. Pickup trucks were sent out on the scheduled day of pick-up. Volunteers for the truck were recruited from local schools and volunteer groups.

The Addison County Community Action used the following reasons as an incentive to encourage people to donate wood:

- Budget cuts -- energy costs are especially hard felt for low-income and fixed income people.
- Neighbor helping neighbor.
- Local initiative undertaken by local people.
- Individuals won't miss a few logs.

In the winter of 1981-1982, the Addison County Community Action collected 25 cords of fuelwood, and most of what was distributed went to low and fixed income families.

Wood can also be collected as part of the receipts from management of the town forest, or donated by a fuelwood coop or local fuelwood dealer.

Storage Facility

Wood should be protected from the natural elements. Such storage facilities as church sheds, town sheds, or unused coal bins would serve the purpose.

Distribution of Wood

Decisions on who should be eligible for receiving the fuelwood can be based on a written or unwritten set of criteria, such as income, wood as a percent of energy requirements, extenuating circumstances, etc.

Resources

Addison County Community Action
Vergennes 811-2521
Middlebury 388-2285

PROPERTY TAX EXEMPTIONS FOR ALTERNATIVE ENERGY FACILITIES

Introduction

In 1975, the state of Vermont passed enabling legislation (32 V.S.A. 3485) allowing towns in Vermont to vote to "exempt alternative energy sources from real and personal property taxation". As of 1982, approximately 40 towns have adopted such an ordinance, most of them adopting the wording of the state statute verbatim. However, the state's wording allows for a wide range of interpretations as to what exactly is included in the definition of an alternative energy facilities and its components. This ambiguity may partially explain the rejection of the ordinance in several towns, including Brattleboro (1977), Middlesex (1980), and Waitsfield (1982). Towns may be more willing to pass an ordinance in which:

1. The ordinance specifies what alternative energy facilities and components are eligible for exemption and;

2. The suggestions of selectmen, town officials, and townspeople are solicited as to what facilities and components should be eligible for exemption.

After rejecting the ordinance in its original form, the town of Brattleboro, in 1982, passed a reworded version which specifically details what facilities and components are eligible for exemption. Of equal importance, the suggestions of selectmen, town officials, and townspeople were significant in the final draft of the ordinance.

The Enabling Legislation

The state statute does include several key provisions as to what alternative energy sources qualify for property tax exemption. "An alternative energy source includes any plant, structure, or facility used for generation of electricity or production of energy":

1. Used on the premises,

2. For private, domestic, or agricultural purposes,

3. May not be for sale or exchange to the public.

The following alternative energy sources are included (but not limited to):

1. Grist mills,

2. Wind mills,

3. Facilities for the collection of solar energy,

4. Facilities for the conversion of organic matter to methane.

And all components thereof,' including land upon which the facility is located (not to exceed 1/2 acre).

Probably the greatest ambiguity is found in the definition of "facilities for the collection of solar energy". "Solar energy" is a broad and encompassing term and can include in its definition such energy sources as wood, hydro, wind, and direct solar gain. Also, the collection of solar energy can occur in a wide variety of devices and structures. For instance, might not the term "facilities in the collection of solar energy and all components thereof" be interpreted as including the entire heating system of a solar heated home, and the land on which the house is built. Or, might not the term also be interpreted to include a wood furnace, chimney used for the furnace, and related ductwork.

An ordinance which leaves room for such a wide range of interpretation might not be agreeable to selectmen, town officials, and townspeople. Therefore, detailing more precisely what alternative energy facilities and components are eligible for exemption, might find a more receptive audience.

A Guideline for Choosing Which Facilities to Include

The "primary or exclusive use" guideline can be used to help choose which alternative energy facilities and components should be included in an ordinance. This guideline can be used to limit from exemption facilities and property unless they are used primarily or exclusively in generating energy (and components thereof).

In regard to facilities utilizing the direct gain of the sun's rays, this guideline is helpful because solar facilities may serve dual functions. For instance, solar wall collectors, while providing storage for the sun's heat, also provide building structural support. Solar greenhouses while providing space heat for a home, also provide increased living space. The dilemma can be approached in a variety of ways.

The town of Marlboro decided to exclude from exemption normal building and architectural components, such as windows and structural masonry; while solar greenhouses are exempt from 50% of normal taxation. Brattleboro effectively eliminated all structural elements such as foundations, floors, walls. and rafters. Your town may wish to provide a 50% exemption for all components which serve a dual function, and give full exemption for storage devices such as rock beds and water storage which are used exclusively for that purpose. Other passive solar collectors {such as thermosiphoning air

panels and water heaters) may be specifically listed and given full exemption.

The State Property Tax Division recommends exempting passive solar systems (systems which utilize no mechanical parts) to the extent that they represent additional cost of construction of a building. Structural elements are only to be exempt if they are used exclusively to house or support the facility.

For greenhouses to qualify for exemption, they must have a means for warm air flow into the living space, and means must be taken to thermally isolate the greenhouse from the living space or to insulate the glazing on the greenhouse. (See attachment labeled "Ruling from Division of Property Valuation and Review".)

The "primary and exclusive use" guideline can also be applied in deciding which wood-fueled facilities and components should be granted exemption. Should wood-fired sugar rigs, chimneys used or built specifically for wood stoves, energy-efficient fireplaces, and wood furnaces and related ductwork be included as exemptable items? In Marlboro, the ordinance specifically includes central wood-burning furnaces which must have heat distribution through pipes and ducts; your town's ordinance should be as specific as possible.

The "primary and exclusive use" guideline can be applied to solar electric devices,wind energy systems, hydro facilities, methane producing facilities, and their components. The Brattleboro ordinance excludes all structures unless they are necessary for the actual support or housing of a facility.

Again, the state statute allows for a wide interpretation as to what alternative energy facilities and components can be considered for exemption. The "primary or exclusive use" guideline can help in defining which facilities your town may wish to exempt. The more specific the ordinance, the less room for ambiguity in its interpretation.

Working With the Town

Working closely with the selectmen, town officials and townspeople is vital to passing an ordinance. The selectmen and townspeople can be crucial in providing suggestions about what alternative energy facilities and components they would like to see in an ordinance. The town listers can help determine if an ordinance is manageable ana practicable. The town attorney can be helpful in drafting a legal ordinance, leaflets can be distributed to the townspeople prior to town meeting explaining the ordinance, the need for it, and what items are exemptable. Public meetings can be held to receive

suggestions and explain the purpose of the ordinance. It is recommended that someone knowledgeable in the solar field work with the drafters and future executors of the bill to familiarize them with the brass tack details of solar installations they may have to evaluate in the future.

The following objections may be raised about the ordinance:

1. The ordinance gives an unfair tax advantage to homeowners with alternative energy facilities or those planning to purchase them.

   - Untrue. As it stands without the ordinance, homeowners who have such facilities (or plan to purchase them) are taxed unfairly. Compared to conventional energy facilities, alternative energy facilities such as solar domestic water heaters or passive solar homes have higher initial capital costs. The ordinance would remove the disproportionate tax liability brought on by this higher capital cost of alternative energy facilities.

2. The ordinance favors the rich.

   - Untrue. As it stands without the ordinance, only the wealthy can afford to pay the increased tax burden brought on by the higher capital costs of an alternative energy facility. Removing the increased tax liability will make these facilities affordable to a wider income range.

3. The ordinance won It help me if I don It have (or plan to buy) an alternative energy system.

   - Untrue. By making the facilities more affordable, this will increase their sales, which increases employment and incomes in the local economy,[1]

Miscellaneous

Other provisions which an ordinance can include:

1. A proviaion which states that cost figures for construction and installation of alternative energy facilities should be made available to the lister upon request by persons wishing to receive

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1Many studies indicate solar technologies bring about a several fold increase in local incomes and employment when compared to oil and gas expenditures.

benefits from the exemption.

2. A renewal date - a date to bring it back before the voters for reconsideration, i.e., 5 or 10 years.

3. A test period - Marlboro passed the ordinance for a one-year trial period, and then revoted the following year for an extension.

Free-standing wood stoves and fireplaces are already exempt from personal property taxes.

References

1. Solar Alternative Inc., Matthew Friedlander, 71 Main Street, Brattleboro, VT 05301

2. Town Clerk, Marlboro, VT 05346

3. Town Clerk, Brattleboro, VT 05301

4. Department of Taxation, Division of Property Valuation and Review, 43 Randall SV., Waterbury, VT 05676 *(802/241-3500)*, Geron M. Carlson, Director.

RULING FROM DIVISION OF PROPERTY VALUATION AND REVIEW

S(32)3845-1: Property Tax Exemption for Alternate Energy Sources This rule shall apply in all municipalities which vote to exempt real and personal property under the provisions of 32 VSA, S3845, when the article voted contains no definition of alternate energy sources.

Sun, wind, water, or methane powered facilities used for the generation of power used solely on the premises for private, domestic, or agricultural purposes, no part of which may be for sale or exchange to the public, shall be exempt from the property tax. The land under such facilities committed solely to those facilities shall also be exempt up to one half acre. Devices used primarily for the collection, storage, or distribution of solar energy, shall be exempt from the real and personal property tax to the extent that they represent additional cost of construction of a building. Structurai elements shall not be exempt unless they are necessary to house or support the alternate energy facilities and are used for that purpose only.

For a solar greenhouse to qualify as a passive solar system, it must be attached to a living space and have a means for warm air to flow into the living space. Means must be provided to either thermally isolate the greenhouse from the living space, or to insulate the glazing on the greenhouse when solar conditions are such that no heat gain to the home would otherwise be achieved.

S(32)4222-1 Appeals to the Listers Requiring Hearings and Determinations. The board of listers must determine the appeals of all persons who have filed their objections in writing prior to or at the time fixed for hearing appeals. The board of listers must also determine the appeal of any person who objects in writing within a reasonable time to any change in an appraisal received by such person after the time appeals were heard.

S(32)4222-2 Proper Notification of the Listers' Determination. The listers shall send notice of their determination to taxpayers who have appealed to the listers. In the case of any controversy subsequently arising it shall be presumed that the personal notices were not sent unelss they were sent by registered or certified mail, or a certificate of mailing of the same was obtained from the post office.

BRATTLEBORO ORDINANCE

Article 24 as warned has been subject to criticism from the Lister's office and the Finance Committee. The following amended version has been prepared in response to their concerns. We feel that this version eliminates the difficulties in interpretation and administration which they pointed out, while preserving the intent of the original article.

Proposed Amendment to Article 24:

To see if the Town will vote to exempt the following alternative energy systems from real and personal property taxes in accordance with 32 V.S.A. 3485 provided that the energy generated or produced by said systems is used on the premises for private, domestic, or agricultural purposes, no part of which may be for sale or exchange to the public.

1: Solar energy systems for space heating, cooling, or water heating which collect, store or distribute solar energy. Structural elements such as foundations, floors, walls, and rafters shall not be exempt under the provisions of this article.

2: Solar electric devices and components. Structural elements shall not be exempt except for those structures which are necessary to house or support these devices and components which are used for that purpose only.

3: Wind energy systems, including towers, rotors, power converters, controls and energy storage devices, for the production of electricity, heat or mechanical power. Structural elements shall not be exempt except for the structures necessary to house or support towers, rotors, etc. and used for that purpose only.

4: Hydro energy systems, including dams, penstocks, plplng, turbines, generators, controls and storage devices, for the production of electricity, heat, or mechanical power. Structural elements shall not be exempt except for the structures necessary to house or support the hydro machinery itself and used for that purpose only.

Owners who wish to receive the benefits of tax exemption under this measure will be required to make purchase, installation, and construction costs available to the lister's office if asked.

Any exemption granted pursuant to this article shall expire on March 31, 1992 unless renewed by action of the annual representative Town Meeting in

March of 1992.

Note: This amended version of Article 24 adopts some of the Lister's language almost verbatim. Structural components which serve multiple functions are specifically not exemptable. Homeowners are required to provide documentation to the listers on request, which should minimize extras work for the listers. This version restores the exemption to mUlti-family residences and agricultural applications.

Passive and active systems are not differentiated here. This was done to eliminate confusion over what parts of passive systems should be exempted. Basically, all structural elements would not be exempted, no matter what sort of systems they appear in. Thus, almost all of a solar greenhouse would not be exempt. Very little of a new passive home would be exempt. Only those components which actually "collect, store or distribute solar energy" - and nothing else - would be exempted. Thus, concrete floors and thermal mass walls would not be exempted.

Finally, in contrast to both the original article and the lister's proposal this amended version limits the time during which this article would be in effect. It would expire in 1992 unless renewed by Town Meeting at that time.

TOWN OF MARLBORO ORDINANCE

Present Version of Article 25

To see if the Town will vote to exempt alternative energy sources ad defined in 32 V.S.A. Sec. 3845 from real and personal property taxation.

Proposed Amended Version of Article 25

To see if the Town will vote to exempt the following alternative energy systems from real and personal property taxation for the year 1979.

1. Active Solar Collection Systems, which include devices to collect, to store and to circulate solar energy with the aid of pumps or blowers.

2. Passive Solar Collection Systems, which include devices to collect and to store solar energy directly. Normal building architectural components such as windows and structural masonry walls, are not included. because they serve a dual function, solar greenhouses will be exempt from one-half of the normal taxation.

3. Solar Electric Devices and Components, which convert solar energy to electricity.

4. Wind Energy Systems, which include towers, rotors, power converters controls and energy storage devices, for the production of electricity, heat or mechanical power.

5. Hydro Energy Systems, which include dams, penstocks, piping, turbines, generators, controls, and storage devices, for the production of electricity, heat or mechanical power.

6. Wood-Burning Systems, which include central wood-burning furnaces which must have heat distribution pipes or ducts. Chimneys may be included if built specifically for the wood furnace. Wood stoves and fireplaces are not included.

Land Use Planning: Facilitating Energy Conservation and the Use of Renewable Energy Resources

Introduction

There are a variety of pr-ov i sa ons in the Vermont Municipal and Regional Planning and Development Act (Title 24, Chapter 117), that enable municipalities to develop policies which facilitate energy conservation and the utilization of renewable energy resources and implement them by adopting or amending land-use control bylaws. Land use policies and controls offer the most effective means for influencing future energy use in a community. The following are reviewed:

1. The Municipal Plan
2. Zoning Ordinances
3. Subdivision Regulations
4. Conditional Use Review
5. Site Plan Analysis and Review
6. Variances

I. Municipal [Master] Plan

The municipal plan provides the legal framework for any proposed changes in the zoning and subdivision regulations. (See 24 V.S.A., Sec. 4382) Changes in the regulations are justified only when they comply with adopted public policy expressed through the plan. The plan should include policy statements which declare the pUblic's interest in encouraging energy conservation, protecting solar access, and reducing a community's dependence on imported, non-renewable resources. In preparing changes or additions to the plan, it is important to remember that facilitating energy conservation and the development· of renewable energy resources is only··one of the many considerations or concerns to your community's growth and development. See "Middlesex Energy Plan", for one example.

II. Zoning Ordinances

A. Barriers to the Development of Renewable Energy Systems

The following are examples of zoning requirements that can unintentionally impede the installation of a renewable energy system. They are accompanied by suggestions on how to reduce or remove these barriers.

1. Structural height limitations on windmills and rooftop collectors. Windmills with blades less than 20 feet and rooftop collectors less than 10 feet have been exempted from restriction under 24 V.S.A., Section 4409(e). Should a municipality wish to limit the height of these structures in any district, the municipal zoning ordinance must contain specific provisions for their regulation.

2. Building setback and yard requirements. These zoning requirements could prevent homeowners whose dwellings are in conformance from installing a solar collector or a greenhouse in their front, side, or rear yard. Guidelines can be incorporated in the zoning ordinance for granting variances to renewable energy systems under 24 V.S.A. Sec. 4468 (b).

3. Ground coverage requirements. These requirements could prohibit the construction of an accessory structure that would exceed the maximum permissible percentage of a lot that may be occupied. Guidelines can be incorporated in the zoning ordinance for granting variances from the coverage limitation for renewable energy systems under 24 V.S.A., Sec. 4468(b).

4. Yard projection limitations. These requirements can prevent the use of overhangs and shading devices for south facing walls and solar collectors because they project into rear, side, or front yards. Guidelines can be incorporated in the zoning ordinance for granting variances to renewable energy systems under 24 V.S.A., Sec. 4468(b).

5. Performance standards for glare, lighting, and reflection. The criteria established in the zoning regulations, which is used to estimate the magnitude of a nuisance, may be too broad, and solar collectors may be prohibited merely because they cause an unattractive glare. Glare performance standards can be limited so that the restrictions apply only to safety considerations (i.e., glare to moving vehicles).

6. Steep slope limitations. The zoning ordinance may prohibit the construction of roads in excess of an established gradient, and thus limit development on south-facing slopes. Revisions in the ordinance can allow for development on slightly steeper slopes than currently permissible if the lots meet certain soil, water, erosion, access, and public utility standards.

B. Transportation Energy Conservation

The following changes in the zoning ordinance are recommended to reduce the traveling distances between origin and destination.

1. Locate residential development near employment and commercial centers. Increasing residential densities near employment and commercial centers allows for more compact settlement patterns. and thus more residents in a given location. Densities can be increased by reducing minimum lot size requirements.

2. Permit multi-family and single family attached housing. This also allows for more compact settlement. MUlti-family and single family attached housing also require less energy for building energy requirements. Possible changes in the zoning ordinance can include: 1) reduce minimum lot sizes. 2) increased maximum allowable building heights (as long as solar access isn't compromised). 3) reduced maximum ground coverage limits.

3. Allow mixed-use development. Allowing commercial services in or near residential areas reduces traveling distances. Zoning ordinances could be amended to allow certain types of mixed residential and commercial development. The conditional use permit system can be used in conjunction with mixed-use development to assure compatibility of uses and preclude anu adverse impact. See Section labeled "Conditional Use".

C. Building Energy Requirements

1. Planned Residential Development (PRD). See 24 V.S.A., Sec. 4407. This enabling provision encourages use of the cluster residential development concept. innovative site design. and spatial layouts. These enabling considerations can be specifically applied to energy conservation and the development of renewable energy resources. A PRD bylaw provision enables a developer to modify individual lot and siting requirements in accordance with conditions set forth in the PRD bylaw provision. Under 1982 amendments to 24 V.S.A. Chapter 117. PRD bylaw provisions may now allow for a higher density of residential land use than specified in the zoning ordinance district density requirements for conventional individual lot development. This density bonus is intended as an incentive to developers to undertake development in accordance with the PRD provision.

For municipalities with subdivision regulations in effect. the PRD zoning provision would authorize: 1) development in accordance with the PRD concept; and 2) any bonus. All development standards. review. and approval procedures would be incorporated in the subdivision regulations.

For municipalities without subdivision regulations. the PRD would serve as the authorization prOV1Slon and would contain the development standards. review. and approval procedures. Refer to the section labeled "Subdivision Ordinances" for guidelines

pertaining to building energy requirements.

2. Planned Unit Development (PUD). PUD's are similar to PRD's, except they allow for mixed uses within the cluster development.

3. Solar Access. Protecting existing and potential solar access to the sun's rays has to be treated differently in developed and undeveloped areas. In partially developed areas where development patterns have been established, the subject is controversial and legally uncertain. Protecting solar access in undeveloped areas is much more feasible and recommendations are included under the section labeled "Subdivision Ordinances."

III. Subdivision Ordinances

The subdivision review and approval process can assure the proper orientation of streets, lots, and buildings, the siting of structures, and the control of vegetation to maximize energy conservation and solar access. A subdivision ordinance can be one of the most effective ways for impacting energy demands in future development. (See 24 V.S.A. Sections 4407 and 4413(c) for the wording of the enabling legislation.)

1. Orientation Any combination of street, lot, and building orientation can be used to maximize southern exposure for solar gain.

   a. Street - An East-West oriented street allows the longest side of the house to face south. A standard can be established that encourages deviations less than 30 degrees to north or south of a true E-W axis.

   b. Lot line - When streets cannot be oriented along an E-W axis, lot lines can be varied from the traditional 90 degree angle to the street to accommodate for the varied topographic conditions at a site. Lot lines should be based upon an orientation to the sun. Lots should be laid out so that on E-W oriented streets the long side of the building faces the street, and on N-S oriented streets, the narrow end of the building faces the street.

   c. Building While street and lot line orientations are important, the location and orientation of the building itself is the most significant factor in providing for solar gain. Buildings should be sited on an E-W axis as much as possible.

2. Landscaping - Proper landscaping can reduce heating and cooling

needs of buildings, and allow fairly high density development, while still maintaining privacy, and add to the general appearance and comfort of an area. Vegetation can provide protection against chilling winter winds and provide shade from hot summer suns. Earth fill can provide excellent insulation. The use of energy efficient landscaping can be listed as a major consideration in a subdivision ordinance.

3. Multi-family dwellings - These are generally more energy efficient, through their use of shared walls. They also avoid many of the shading problems incurred by single family residences, and make potential use of neighborhood scaled energy technology.

4. Solar easements - Easements are important as a back-up to zoning regulations or even solar access conditions in a subdivision ordinance. Zoning and subdivision ordinances usually don't provide protection from tree shading problems. The solar easement, which is a private contractual agreement between two or more neighbors, can be stipulated as a condition for approval to a development.

5. Bike and pedestrian paths - These can be suggested for inclusion in a development.

6. Protecting solar access - There are basically two approaches to protecting an individual's rights to solar access.

   a. Prescriptive standards - This approach involves specific changes in frontage and sideyard requirements, and maximum building height restrictions to assure access to solar energy. The Addison County Regional Planning and Development Commission has worked with several communities to provide for solar access. The Commission examined the frontage and sideyard requirements and maximum building height for various zoning district and made recommendations based upon existing requirements and projected shadows. The following is a procedure the Commission used to examine solar access:

      i. First, determine the degree to which your community wishes to protect solar access; for example, rooftop, south wall, south lot. The optimum protection will vary with different zoning districts. The Commission chose to encourage south wall solar access for new residential construction, recognizing that passive solar techniques are an integral part of most solar heated homes in Vermont.

      ii. Prepare a community shading profile to assess the degree of solar access protection that your community's existing zoning bylaws afford, and to determine the changes that would be necessary to provide greater protection. The Commission chose not to include in their analysis the potential shading problems caused by

trees, but restricted the analysis to building shading problems.

iii. Determine which street orientations (i.e., N-S, E-W) to analyze and what assumptions to make regarding building locations on a lot. The Commission chose to examine E-W and N-S street orientations. With respect to building locations, the' Commission examined buildings which were placed the minimum allowable distance from each other (worst case) and in which buildings are sited in a more typical fashion (centered on the lot).

iv, Potential shading problems were then examined using a series of data tables and mathematical calculations.

v. The Commission chose to allow some shading problems to exist, particularly in the worst case. It was felt these recommended changes would be less restrictive, and therefore more politically acceptable.

b. Performance standards - Envelope zoning. Solar envelop zoning makes it a matter of public policy that no south wall (or south-facing rooftop) may be blocked by a building object to the south. This allows for the flexibility to deal with access on a lot by lot basis. Conceptually, a solar envelope can be thought of as a plane extending from a building's south wall (for south wall protection) upward and southward at the altitude angle of the sun at noon on December 21 (the sun's lowest point in the sky). A developer would be required to prepare a shading profile to show no shading problems would be caused by the construction of their building.

IV. Conditional Uses

This provision, of the enabling statute 24 V.S.A., Sec. 4407(2), can offer some protection for renewable energy resource systems in the absence of a detailed solar access ordinance provision. Conditional use classifications are most appropriate in mixed-use and non-residential areas where certain authorized, high-intensity uses may present serious problems at particular sites or under particular circumstances. The board of adjustment may stipulate that no structure, accessory structure, or newly planted vegetaion may deny reasonable access for an existing renewable energy resource system. To assure this protection, conditions may be imposed upon the bulk of a proposed structure, its location on a site, rooftop accessory structure, architectural features, plantings, and fences that obstruct solar access.

V. Site Plan Approval

The site plan approval procedure (24 V.S.A. Sec. 4407) gives the Planning Commission authority to impose conditions and safeguards with respect to landscaping and screening, the protection of renewable energy resources, and adequacy of traffic access and parking. This provision applies only to uses other than 1 or 2 family dwelling units. Site plan review, which has criteria similar to some of those contained in conditional use review, can be especially useful in providing for conservation and renewables in multi-family and non-residential use areas.

VI. Variances

Under 24 V.S.A. Sec. 4468, the board of adjustment is authorized to grant variances for a structure that is primarily a renewable energy resource structure that could not otherwise be developed or function effectively if required to conform to certain requirements of a zoning ordinance. This can apply to a solar collector,greenhouse, windmill, or other renewable energy resource system. In order to grant a variance, the board must establish for the record that:

1. it is "unusually difficult" or "unduly expensive" to build the renewable energy reosurce structure in conformance with the zoning regulations;
2. the hardship was not created by the applicant;
3. the variance, if granted, will not alter the character of the neighborhood, impair the use of adjacent property, reduce access to other renewable energy resources, or be detrimental to the public welfare; and
4. the variance, if authorized, will represent the minimum that will afford relief.

Resources

1. Vermont Municipal and Regional Planning and Development Act (24 V.S.A., Chapter 117) Free.
2. Bill Mitchell, Chief of Technical Assistance, Agency of Development and Community Affairs, Montpelier, Vermont. (828-3217)

3. Solar Commercialization in Addison County, Vermont. The Addison County Regional Planning and Development Commission, Middlebury, Vermont 1979-1980. Free.

4. Planning the Energy Efficient Community. Northern Energy Corp., 470 Atlantic Avenue, Boston, Massachusetts. $25.00

5. Overcoming Land Use Barriers to Solar Access: Solar Planning Recommendations for Local Communities. Central Naugatuck Valley Regional Planning Agency, 20 E. Main St., Waterbury, Connecticut, 06702. February, 1980. $5.00

6. Regional Planning Commissions - for local technical assistance.

7. Site Planning for Solar Access: A Guidebook for Residential Developers and Site Planners. Duncan Er1ey and Martin Jaffe. American Planning Association, Chicago. Available through the U.S. Department of Housing and Urban Development, Office of Policy Development and Research, Washington, D.C.

8. Protecting Solar Access for residential Development: A Guidebook for Planning Officials. Duncan Er1ey and Martin Jaffee. American Planning Association. Available through U.S. Department of Housing and Urban Development.

Vanpooling and Carpooling

VANPOOLING

Introduction

Vanpooling can provide an enjoyable solution to the high cost of commuting to work. The State Energy Office (SEO) estimates that each vanpool member can save a minimum of $750 - $1,000 per year over the costs of driving to work alone. These savings are attributable not only to reduced gasoline costs, but also to reduced insurance premiums, maintenance costs, depreciation costs, and other reductions. The SEO is eager to help any interested group in all aspects of setting up a vanpool. They can provide information on the initial considerations before a general meeting, and they will attend meetings to provide further information on financing, operating procedures, finding other vanpool members, and the general workings of-the program. Vanpools are an ideal solution to help reduce commuting costs.

Planning Steps

1. Contact the SEO to discuss initial considerations before a general meeting.
2. Form a group of 5-7 people interested in vanpooling.
3. Hold the first organizational meeting. A SEO staff member will be eager to attend the meeting and to supply the group with information about:
    a. Type of vehicle to be used
    b. Method of organization
    c. Contracts, if the vehicle is leased
    d. Insurance coverage
    e. Fare structures
    f. Bookkeeping (minimal)
    g. Potential routes
    h. Incorporation (if desired)
    i. Any ·questions about the program.

General Operations

1. In Vermont, a company or a group of individuals lease or purchase a

15-passenger van which is used to commute to and from work. Each member shares equally in the cost of the operation and derives an equal benefit. No one makes a profit on the operation, but each member enjoys a drastic reduction in their commuting costs.

2. Vanpoolers select a driver to be responsible for the vehicle. The driver normally enjoys a reduced fare.

3. The driver follows a set route, picking up the other vanpool members along the way.

Benefits of Vanpooling

1. Reduced energy and operating costs. Using figures provided by the SED comparing the total costs (gasoline, oil, financing charges, registration, insurance, depreciation, and maintenance for commuting 45 miles a day, 5 days a week:

Standard sized vehicle (single passenger)	$ 60.15
12 Rider vanpool	12.65
15 Rider vanpool	10.15

Costs will vary according to vehicle, individual, etc., but the cost savings is clearly evident.

2. Maintenance and repair bills. These bills will be significantly lower, along with the extended life and value of your vehicle.

3. Relaxation. Individuals are freed from the frustrations of driving, and enjoy the company of each other.

Miscellaneous

To solicit. ridership, matching cards requesting information about an individual's driving route, work hours, name and address can be dropped off at places of business in town.

There are approximately 123 vanpools operating in Vermont as of May, 1982.

CARPOOLING

Carpools are also an effective way to reduce high commuting costs. Vanpools are generally more cost-effective for the individual, but carpools are ideal in situations where there are less than ten people commuting from a given area, or when the commuting distance is less than 15 miles. They are easy to form,and require less of a commitment than vanpools.

Various driving arrangements can be made. Carpoolers can rotate using their own vehicles, or only 1-2 individuals can choose to drive all the time in return for some type of compensation. The latter cast might be desirable if an individual needs their vehicle during the working day, or if others prefer not to drive during the winter.

Commuter lots can be set aside by making arrangements with the town selectmen and State Energy Office. The SEO can be very helpful in providing names of other individuals commuting from a similar area, and in providing information on the advantages to establishing a carpool.

References

State Energy Office - Contact Lee Perkins 1-800-642-3281, or 828-2393

Selected Annotated Bibliography

A. Energy Plans

1. Addison County Regional Planning and Development Commission
1980 Energy Element for Addison County, Vermont. Addison County Regional Planning and Development Commission, Middlebury, Vermont, September.

The first regional energy plan in the state: provides a quantitative analysis of energy consumption for the county, its impacts, and recommendations which "address those areas of concern which local and regional governmental bodies can have a direct impact."

2. Goldberg, David
1982 Montpelier Energy Plan. Montpelier Community Development Agency, Montpelier, Vermont. May.

Commissioned and funded by the Community Development Agency. this Plan is a well-researched document that comprehensively addresses the energy issues facing the city.

3. Portland Energy Office
1981 Portland Energy Action Plan. City of Portland, Portland, Maine.

A well-prepared plan which contains sections on energy use, community values and goals, and detailed recommendations.

4. Madison Energy Conservation Committee
1981 An Energy Plan for the City of Madison. City of Madison, Madison, Wisconsin, October.

An easy to read model which contains useful recommendations for a medium sized city as well as some appropriate for rural areas.

5. Zahner. Mike
1982 Regional Energy Plan for Central Vermont. Central Vermont Regional Planning Commission, Montpelier, Vermont. February.

The second regional energy plan in the state; serves the same basic function as the Addison County Energy Plan, but also provides a rationale and implementation section for each recommendation.

B. Guides

1. Arrowstreet. Inc.
1980 Massachusetts Local Energy Action Program. Massachusetts Municipal Association, Boston, MA.

A useful guide containing sections on organ1z1ng and planning, local action catalog, case histories. and funding.

2. Bryan, A.D.
1979 Vermont Guide to Solar Heating. Vermont State Energy Office, Montpelier, Vermont.

A valuable guide book which contains information on costs and types of solar applications directed toward the homeowner.

3. Energy Advisory Board
1979 Vermont Town Energy Handbook. Office of the Lieutenant Governor, Montpelier, Vermont, December.

A reference book specifically for town energy coordinators which briefly provides information on financial resources, how to start a town energy program, and some energy publications.

4. Letteri, John C., Thomas L. Daniels, and Energy Advisory Board
1979 The Energy Advisory Board Report. Office of the Lieutenant Govenor, Montpelier, Vermont, December.

A comprehensive guide to energy issues which can be addressed at the state, regional, and local levels.

5. Kellington, Kim
1980 Solar Commercialization in Addison County. Addison County Regional Planning and Development Commission.

A helpful guide to aid towns in providing for solar access in their zoning and subdivision bylaws.

6. Vermont Energy Action Council
1982 Energy Resource Directory. Vermont Energy Action Council, c/o Jim Ashley, Danville. Vermont.

Geared specifically for Vermont, this guide contains information on a broad range of topics including local energy organizing and municipal energy management, local energy actions, yellow pages of energy products and services, and energy-related services offered by government agencies and private organizations.

C. Case Studies in Energy Planning

1. Gery, Michael E.C.
1980 Groundwork: Energy Planning in Franklin County, Massachusetts. U.S. Department of Energy, Region I.

Copies are availabLe from the Vermont League of Cities and Towns, Montpelier, Vermont. A fine overview of energy planning efforts using a county-wide coordinating body.

J

2. Ridgeway, James
1980 Energy-Efficient Community Planning. The Jg Press Inc./The Elements.

Provides a review of community planning efforts in Seattle, Washington, Davis, California, Northg1en, Colorado, and Hartford, Connecticut.

D. Studies

1. Bently, Geoffry K.
1979 New England Rural Energy Sources. New England Congressional Caucus, Washington, D.C.

Provides an assessment of renewable energy in New England, applications for their use, and potential for each.

2. Drake, Carol
1981 Home Heating Survey of Vermont Households. Vermont State Planning Office, Montpelier, Vermont.

3. New England Energy Congress
1979 Final Report of the New England Energy Congress: A Blueprint for Energy Action. New England Congressional Caucus, Washington, D.C.

Provides more ,:detai1ed information on New England rural energy sources.

4. Vermont Community Energy Project
1982 Socio-Economic and Energy Data Analysis as Applied to Lower-Income Vermonters and Vermont Communities, Vol. I and II.

Copies available from: Vermont Community Energy Project, c/o CVOEO, P.O. Box C-1081, Burlington, Vermont.