

# FIRST ALTERNATE ENERGY HOUSE TOUR

5 MARCH 1977 12 NOON - 4 PM  
SNOW DATE 6 MARCH

FIRST ALTERNATE ENERGY HOUSE TOUR

Sponsored by: P.A.C.E. (PEOPLE'S ACTION FOR CLEAN ENERGY)  
Farmington Valley Chapter  
Box 62  
Canton, Connecticut 06019

SATURDAY, MARCH 5, 1977 (Snow date: March 6, 1977)

12 Noon to 4:00 P.M.

TICKETS: \* \$3.00 (members free) Tickets may be obtained  
by sending a check to:

P.A.C.E.  
West Road  
New Hartford, Conn. 06057

or may be purchased at:



- ... tour home sites
- ... Canton - Village Health Food Store (Canton Village, Rt. 44)
- ... Simsbury - Federal Savings and Loan (Hopmeadow St.)
- ... Farmington - Helen Winter's Grist Mill
- ... West Hartford - Huntington's Book Store (West Hartford Center)
- ... Hartford - Civic Center Public Service Booth (Feb. 21st only)
- ... Glastonbury - Nature's Rainbow (Glen Lochen Mall)

\* P.A.C.E. reserves the right to limit ticket sales. No refunds.

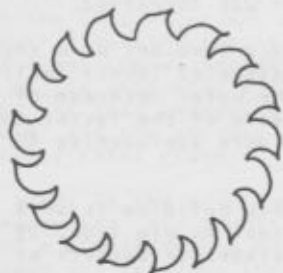
TOUR INFORMATION may be obtained by calling: 658-6233  
693-4377  
693-2575

Thank you for coming...the members of the Farmington Valley Chapter of PACE deeply appreciate the cooperation of each of the tour building owners. Their willingness to share their privacy and experience is most gratifying. We hope to minimize the work and the trouble that a house tour can cause its donors. Therefore, we ask you to:

1. Remove your shoes or boots before entering each house.
2. Do not touch anything.
3. Keep lines moving in crowded areas.
4. Ask questions in a positive manner. Be sure comments are also positive as the home owners may be present.
5. Please dress informally. Two of the homes have new, long driveways. Low boots and warm clothes are recommended. The tour is being held in March so that the actual working systems could be seen in operation.
6. Each ticket has a red number on it. If your ticket is an even-numbered one, please take the tour in reverse order, i.e. E,D,C,B,A, to avoid crowding.

The buildings vary in their use of oil and electricity that would normally be used for conventional buildings of similar size.

All four homes use increased insulation and one or more forms of alternate energy. All five buildings are either new or contain new systems. All five owners are working toward energy answers...not only for tomorrow but also for TODAY.





#### Building A

#### HELEN WINTER'S GRIST MILL

Farmington

**LOCATION:** Turn south onto Garden Street off Rt. 4, Farmington Center; go 1/2 m. on Garden

**PARKING :** On Garden St. (There is a parking area at the Grist Mill but it may be crowded)

**HISTORY :** This building is the only one on the tour that is not a home; it is the oldest mill in Connecticut. Parts of it date from 1650. The hydro-electric system, which is nearly completed, consists of an under-water turbine (1907) which can be viewed from the outside terrace. The generator is inside the shop (far left of entrance door).

**EXPLANATION OF SYSTEM:** Originally an undershot wooden waterwheel connected via a lineshaft powered the machinery in this building. Shortly after the turn of this century, a model "steel wheel" was installed.

The early hydraulic turbines were noted for their improved hydraulic efficiencies (their ability to convert potential energy of the water upstream of the turbine into kinetic energy, the ratio of the latter to the former is the efficiency) which were approaching 80 versus 30 - 50 for the wooden wheels.

The turbine in this building is an S. Morgan Smith "New Success" style, cast in pig iron, 39" diameter wheel with 16 hydraulic (passages or buckets as they are known in

the industry), produced 25 H.P. at 4.5' gross hydraulic head and consumed water at the rate of 60 cubic ft. per second. The turbine drove a 4-3/8's inches diameter steel shaft at 70 R.P.M. A belt drive connected the turbine shaft to the grist wheel. The turbine speed was variable and depended on head and mechanical loading and the operator had little more than open/shut control over the machine. The control of the wicket gates which allow water to enter the turbine was a yoke/dog arrangement that provided the open/shut control. A moveable regulating ring held the dogs and the pivoting wicket gates held the yokes.

The modern turbines have had model test efficiencies as high as 94%. However, this particular turbine is intrinsically incapable of this order of efficiency due to the design of the buckets. The turbine has been renovated by the trimming and reshaping of the foil shape of the buckets in order to gain a few percent of efficiency. The turbine's wicket gates have also been modified in order to increase the swallowing capacity of the turbine. These two factors have increased output power of this turbine.

The uprated turbine drives a generator (12 pole, 600 R.P.M., 60 Hz, 240 VAC, three phase) through a belt pulley assembly that includes a one to nine shaft speed step up. The new arrangement has a turbine shaft speed of 66-2/3's R.P.M. (hence, lower efficiency than at 70 R.P.M., however, not increase in HP due to increased flow capacity).

The generation of 60 Hz electrical energy requires the use of an actuating device (or governor) which has direct and continuous mechanical control over the wicket gates and hence the turbine speed. The new turbine arrangement has direct mechanical linkages between the gates and the regulating ring. The regulating ring is linked to the accuator by a common shaft and connecting arm assemblies. The accuating motor is controlled by the frequency of the output current of the generator and when under/over frequency conditions exist, the motor moves to open or close the wicket gates respectively. Electrical load on the generator will cause frequency changes (assuming the load changes such as switching on another light bulb) and the corresponding regulatory action automatically takes place.

Electrical loads in the mill vary widely during the day, month or season (eg. air conditioning versus electric heating) and a simple method of loading the generator to its maximum and reducing the dependence on purchased power is to switch the load in small "blocks." The operator, through the selection of one or several or all of the nine circuits on the control board, has a choice of energizing from the generator, energizing from

the utility, or not energizing at all. By the monitoring of the KW meter, the operator can decide if more or less load is to be added to or subtracted from the generator's burden.

The generated current is three phase, but, at the control board the phases are split giving three single phase 240 VAC power. Each of the three single phases are connected to three circuits and this partially restricts the operator to the adding of load in a balanced (across the various phases) fashion.

The ultimate expected output of the turbine and generator combination is 160,000 KWH per year.

\* steel wheels were often cast iron

NOTE: Call the Reading Room for reservations if you wish a delicious lunch at 11:30 a.m. (677-7997). A vegetarian plate is served.

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Building B  
THE BARNEY BARNS  
West Simsbury



LOCATION: Turn north off Westledge Rd. in West Simsbury Center onto Old Farms Rd. (45 Old Farms Rd.)

PARKING : on Old Farms Road

HISTORY : A rural/urban experiment in suburbia, this unusual and dramatic home combines the past, present and the future. It is interesting not only for its design, heating systems and conservation features, but also for the life style its owners seek to attain. Care and thought has been invested into all aspects of food production, economic transportation and recycled possessions.

Founding Idea: To rebuild a barn (utility building) using authentic and natural materials and building technology, but adapting where necessary for energy savings and owner's life style. Structural materials came from one 18th century barn from East Granby; one-half of a 19th century tobacco shed (with entire slate roof) from Hatfield Mass. All joints are mortice and tenon. All stone is from Barney property, Tuller property, or other farm properties in Connecticut. Owner wanted to preserve barn

architecture in as pure a form while making it a practical building...for 200 or more years. The ghosts of 1745 will continue to live in their adze and broadaxe strokes well into the 21st and 22nd centuries!

Land Use Notion: On 2.9 acres it was hoped to be able to develop a large degree of self-sufficiency. Lawn and pasture areas serve as fodder for sheep, goats, and two steers (in fattening stage). Barns house two pigs in winter for spring slaughter. Twelve chickens with neighbor provide six fresh eggs per day at a cost of 30¢ per dozen. Land has two vegetable gardens (one 40 x 40 and one 30 x 30). In addition, there are expanding plantings of raspberries, blackberries, and blueberries. A small five fruit orchard of 12 trees will be added in the spring...then bees for honey. Abandoned stone lined well will be converted into a root cellar. On site septic disposal and on site water are the services. A hand pump will soon be added.

Energy related issues:

1. E-22 colling - 3" styrofoam plus.
2. E-26 walls - 2" polyurathane plus a crawl space fully insulated.
3. Western extended hayloft acts as eyebrow allowing full access of southern to western sun in picture windows in winter, but not in summer.
4. High ceilings allow no air to rise in summer exhausted by fan in peak. Siting allows for super breezes in summer (i.e. no air-conditioning needed).
5. Daytime heat in winter provided by 60% oil hot air, 30% central wood stove (King Circulator), and 10% direct sun penetration. Five cords of wood are used per winter in stove; 900 gallons of oil (Oct. - March). For a full 12 months, it would be 1400 gallons. Hot water in oil-fired recirculating system with switch in house allows us to not be heating water when not needed. No tank in system. Heat rising to peak in winter is recirculated by air handler - 20° difference between floor and peak levels. House is kept at 60° in the winter.
6. Designs for solar space heating for house are ready for installation, but not until technology improves -- except for domestic hot water.
7. Wind data soon to be collected for future windmill installation.
8. Outside sliding "barn doors" when installed will act as wind breaks.
9. Curtains will be made as time allows.
10. Storm windows are on inside to preserve exterior appearance of barn sash.
11. By reusing existing building materials, a savings of x number of BTC's in milling, cutting, and transporting new materials was realized. Except

for studs in halls, builders cut and had milled all the new lumber. All flooring planks above the first floor are from recycled silos. Tile is all hand made.

Building C

THE DANIELSON HOME  
Canton Center



- LOCATION:** Turn north onto Rt. 179 from Rt. 44 in Canton. (Rt. 179 is the same road as Cherry Brook Rd.) The home is at 263 Cherry Brook Rd. in Canton Center.
- PARKING :** On Cherry Brook Rd.
- HISTORY :** This handsome and functional home is the result of tremendous thought and time. The fourteen dollar monthly electricity bill speaks for itself!

**BACKGROUND:**

We're not fanatics about conservation, the energy crisis, self-sufficiency or saving money. Our views on these subjects probably coincide with those of most Americans these days. But we had the opportunity to put these views into practice, from the group up, when we built our house in 1975.

The house has about 2000 sq. ft. of living space.. two floors. Downstairs are bedrooms and playroom. Since people need less heat sleeping and playing, these rooms are kept cooler (62<sup>o</sup> night and day). Upstairs (Master bedroom and everything else) it is warmer (from 63<sup>o</sup> to 74<sup>o</sup> in the winter). With the cooler rooms downstairs, the heat stays where it's wanted instead of rising to the rooms that are kept cooler. Fewer drafts, also.

The house is set into a south-facing hill. There are two floors exposed on the sunny south side, but just one floor above ground level on the north. The roof overhangs beyond the walls by two feet, shading the windows in summer but admitting the winter sun. There are lots of windows south, very few on the north (all thermopane). It took weeks to insulate. There's rigid urethane insulation under the perimeter of the slab and against the foundation walls. One inch of urethane is the equivalent of about 6" of fiberglass. The heating system is oil burner/hot water/radiant pipes in the ceilings. On each ceiling is a grid of pipes, which are covered with plaster. Water from the furnace enters the pipes at 105<sup>o</sup> F. and returns to the furnace at 85<sup>o</sup> F. The entire ceiling, then is our heater. The effect is very subtle, with no ceiling-to-floor temperature difference because the heat is transferred by low intensity radiation -- not



convection. No drafts, either.

It's a pity that this marvelous heating system is never used upstairs. Sunlight through the windows, plus our wood stove, do the entire job for the 1100 sq. ft. of upstairs space.

As I am writing this, it is 27<sup>0</sup> outside, 73<sup>0</sup> where I sit in the livingroom, and the windows are open slightly to keep the temperature down -- all done by today's sunlight. After enjoying the sunset this evening, urethane inserts will be placed into each window, greatly reducing their heat loss. At around 7:00 p.m. we will start a small fire in the Lange stove; at 9:30 p.m. it will be loaded with logs, each 4-5 inches in diameter, and that will take us through the night. Tomorrow morning, the upstairs will have cooled off to 64<sup>0</sup>, and a mass of red coals will still radiate in the Lange, warming us at the table. Outside, it's expected to be 5<sup>0</sup>F. As the sun strikes the windows, we will remove the urethane panels, allowing the house to go "solar" again.

Last year (Aug. - Aug.) we used 500 gallons of fuel oil, costing us \$200. That heated the house (downstairs) and our domestic hot water. Two cords of wood (\$80 if purchased -- we cut our own) plus sunlight did it upstairs. Electric bills are consistently \$14-\$16 per month.

We don't have a dishwasher, a dryer, a freezer or disposal. We turn off our furnace during the summer, except for heat-ups at breakfast and supper each day. During winter, we let the dishwasher cool off to room temperature before letting it down the drain. Garbage goes onto the compost heap; newspapers and bottles are re-cycled, and we fill up one trash can in about ten days. We do most of our cleaning with a broom, mop, and carpet sweeper. A cold cellar (corner of our furnace room) keeps our summer garden harvest of potatoes, onions, squashes, carrots and preserves through the winter.

We want to install a solar collector or two to pre-heat our hot water. Something modest (we'd love suggestions). We put pipes to the roof for this purpose when the house was built, and oriented the roof at the correct angle. We also want a small wood stove for downstairs. We figure we could freeze blocks of ice all winter, store them in an underground vault, and trade in the refrigerator for an old fashioned ice chest. Every few days, we would load the ice chest with another block from the underground cache. Without the refrigerator, our electric bill would drop below \$10 monthly and we'd be nearly immune to power failures.

We do these things not out of some moral purpose but because we find it fun. We enjoy harvesting our own food and heat, minimizing our needs, and feeling that to some extent we can satisfy our everyday needs ourselves."

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Building D

THE GALE HOME  
North Canton



**LOCATION:** Continue north on Cherry Brook Rd. (Rt. 179) to North Canton. Home is on east side (721 Cherry Brook Rd.)

**PARKING :** On Cherry Brook Rd.

**HISTORY :** Unfortunately the owners of this exciting home were transferred to the mid-west after the completion of their home. Therefore, the house is open due to the kindness of Valley Properties. Any special questions can be answered by Richard Swibold or Roger Clarke of Canton Six, Collinsville.

**BACKGROUND:** Completed in 1976.  
Solar Engineer, Modern Energy Concepts  
West Hartford  
Architects, Canton Six, Collinsville  
Owners, David and Sally Gale

**Buildings:** Multi level, three bedrooms with 2100 sq. ft. - no basement. Wood frame construction with full insulation, partially below grade.

**Collector:** Air type, field fabricated, built between the rafter spaces utilizing a sheet metal absorber plate and two sheets of wire lath, painted black. The rafters are stained black and the space behind the absorber is insulated. The collector cover is two sheets of tempered glass with anodized aluminum mullions. 750 sq. ft. of collector installed.

**Storage System:** A rock bin below the house with 750 cubic feet of surge stone from 4" to 8" in size.

**Auxiliary Heat:** From an electric furnace and a custom designed fireplace with flue gas heat recailer and fresh air intakes.

**Distribution System:** Exposed ductwork in living -dining areas and concealed ducts in bedroom areas.

**Summer Colling:** Can be accomplished by passing

the cool night air through the rock bed and circulating this air through the bed and into the house. The collector is automatically vented to the outside on hot sunny days, during the colling cycle.

Hot Water Heating: Accomplished by the installation of a 120 gallon storage tank in the rock bed. This system preheats the well water before it enters the hot water heater. During the summer cooling cycle, the cold water helps to cool the rocks.

Performance: The system has not been in operation through an entire heating season. However, the collector and distribution system are functioning. No elaborate monitoring will be done.

Percent Solar Heated: Between 60% and 80%.

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### Building E

#### THE MOCARSKY HOME East Hartland

**LOCATION:** Continue on Rt. 179 into East Hartland Center. Stay on Rt. 179 for three miles. Home is on Foxbrook Rd. (no street sign) Foxbrook is the first right after Fyler Rd; home is 1/2 mile in on right with name at top of drive.

**PARKING :** On Foxbrook Rd.

**HISTORY :** This attractive wood frame home is nestled in pine woods and situated on a brook. It is the residence of the architect who designed it.

**BACKGROUND:**

This 2300 sq. ft. home obtains space heating from an all air solar system. 650 ft. of collector and 70 tons of rock combine to collect and store the sun's energy. The solar system is designed to provide 50% of the annual heating demand. The home also includes a centrally located wood stove to augment the solar system and further reduce the 'on' time of the electric duct heater.

Two recirculating fans located high in the clerestory move the warm air which naturally collects here back down to the main living area. Two of the collector panels also contain copper coils to heat domestic water.

This house is not completely finished on the interior, thus providing views of some of the duct work that would ordinarily be concealed.

P.A.C.E. is a state-wide organization composed of seven chapters. Its members are working toward greater public support of energy conservation and energy alternatives which use benign technologies. Members are gravely concerned about the dangers of nuclear energy.

If you are interested in our chapter, in P.A.C.E. or in forming your own local chapter, please write to:

P.A.C.E.  
Box 62  
Canton, Conn. 06019

or call

658-6233	Farmington Valley
633-3820	Hartford
442-8414	Niantic
824-7604	Canaan
389-2733	New Haven

Memberships are \$5.00.

