[FEATURE] By Ray Anderson | Photography by Lynne Siler

OFF THE GRID in Lost Valley

Can "gracious living" truly be achieved in an eco-friendly home in the Southern Appalachian mountains?

OPPOSITE **Ray Anderson and his wife Pat searched for more than a year to find the perfect property on which to build their log home in the mountains.**

"I would like to have a house in the mountains, a log house. Would you?"

"Yes," I replied, "I would—on a south-facing slope and off the grid."

That exchange between my wife Pat and me started "it" in the autumn of 2000. "It" became our house in Lost Valley.

The mountains that are most easily accessible from our home in Atlanta, GA, are the Appalachian and Blue Ridge ranges of north Georgia, eastern Tennessee and western North Carolina. Over the course of a year, we combed them on weekends, looking for just the right piece of land. We began looking in the area around Highlands, NC, on a glorious weekend in October 2000. Eventually, with the help of a real estate agent named King, we found Highland Gap, turned into its access road through the stone columns marking its entrance and drove for 2½ miles of twisting, turning (but paved) road. We reached the bottom of the valley and were greeted by a bubbling stream of gin-clear water. We learned later that this was Shoal Creek. Alongside it was a small wetland and a cleared meadow.

We crossed the stream on an earthen bridge and began to climb out of the valley, up the opposite ridge. Shortly we reached a shaded plateau and decided to sit for a while in the shade and listen to the stream below us, from which issued enough sound to suggest some kind of waterfalls were there. Shoal Creek turned out to be quite nice, with its waterfalls and natural stock of fingerling rainbow trout.

We could see that the way ahead quickly grew quite steep and I was ready to turn back, but Pat began to explore and we eventually emerged on a cleared knoll. The view took our breath away! Looking southwesterly down the valley, we could see that it stretched miles down into Georgia. Looking up the valley, we were stunned by autumn's reds and oranges on Rattlesnake Ridge, the eastern ridge we had descended to first reach Shoal Creek. The listing had indicated that the tract was 86 acres.

In our hearts, we knew this was it, but we decided to keep looking to be sure. So we looked for almost a year and never found another tract that approached Lost Valley in appeal, including its convenient location two hours from Atlanta. In August 2001, we bought the property, which was contiguous with Forest Service land along our western boundary. Nice neighbor! We learned later the Forest Service had not allowed trees to be harvested from the area for more than 100 years.

Coincidentally, we had been thinking along a different, but related, line even while we were still searching for land. Somewhere, somehow, beyond my memory, I had met Taylor Barnhill, who ran an organization named The Southern Appalachian Forest Coalition, whose mission was to assemble and protect ecologically sensitive areas of the southern Appalachian Mountains. Sensitive to his cause, we wondered whether we could help in this mission while satisfying our own wishes for a home site. So we went to see Taylor at his office in Asheville, NC, to learn more about his work and how we might fit into his mission. There we met Katherine Eddins, a former environmental lawyer who had left her law practice to found the Chattawah Open Land Trust. Katherine taught us that day about conservation easements and how they are used in a public-private partnership to protect land from development. Taylor and Katherine's mission became our mission that day in Asheville.

Katherine explained the procedure: Have a land planner develop a plan for the "highest and best" use of the land. If ever there was a misnomer! That really means the densest possible development or, if you will, the "lowest and worst" use to the conservation-minded. Then take that plan to a land appraiser and have him appraise the undeveloped land with this maximum development in mind.

Simultaneously, you negotiate with a land trust such as Chattawah, a not-for-profit entity that is chartered to hold conservation easements and enforce their terms. The negotiated terms of the easement define what portion of the land you agree never to develop, forever; thus binding you and your heirs and assigns in perpetuity. In the negotiation, you reserve the uses of the land that you wish to retain, including such activities as selectively harvesting trees or hunting; by your own definition, the right to full enjoyment of the land. You also define the "outs," those areas excluded from the easement, for which you retain full rights to develop.

Before we even owned the land we had decided to go the conservation easement route, ideally reserving three home sites: ours plus one for each of our two daughters. A bit more than a year after closing on the land, we signed with Chattawah Open Land Trust to put 79.18 acres into a "forever wild" easement. The 86-acre tract extends from almost the top of one ridge to the top of the other, so it is a slice through an entire watershed and an extension, as it were, of the Forest Service land to the west. That stretch of Shoal Creek is very healthy and, if we have our way, is going to stay that way.

A DIVISION OF LABOR

Deed in hand after closing on the land purchase, we set about to plan our log cabin in the mountains, off the grid. A division of labor quickly took effect: Pat took aesthetics, I took the practical stuff. We worked together on some things, such as the size and location of rooms. The first task was to retain an architect. Pat picked Jack Davis, whose office is four blocks from where we live in Atlanta and whose work she really liked, especially his sense of exterior design aesthetics.

RIGHT **No live trees were harvested for the home's log exterior. A "split log" construction ensured superior insulation value.**

I set about to educate Jack and his assistant, Chris Redmon, on building off the grid—meaning no connection to any of the public utilities we take for granted in the city, such as electricity, city water and sewerage, and natural gas lines, none of which were available in Lost Valley. We actually considered hooking up our proposed photovoltaic (PV) system to the local electric grid, and inquired with the local electric utility about its charge to run power lines underground the mile to our site. (Trees fall all the time, so you don't want power lines on poles.) Their quote was $40,000—if they didn't hit rock! There's lots of rock in those hills. So then we inquired as to what they would pay us for electric power we might supply to their grid during times of hot sunshine and surplus on-site PV generation (when they would need it most because of their own line losses). They offered about one-fourth the price they would charge for the same power. We never called back. North Carolina should have reverse metering, as many states do, to encourage distributed generation as a hedge against system-wide blackouts.

> "First, though, I had to get my own head clear about exactly what 'off the grid' meant. How does one do that?"

First, though, I had to get my own head clear about exactly what "off the grid" meant. How does one do that? I reached out to some of my eco-friends for their advice: Dennis Creech, John Picard, Bill Browning, Steven Strong, and Gail Lindsey—all experts in green design. When Steven, one of the world's leading experts on photovoltaics, heard we wanted a log house with all the comforts of city living—appliances and all the rest (he called it, I thought a bit sarcastically, "gracious living in the mountains")—and wanted to power and heat it with solar energy, he expressed extreme skepticism. Insulating a log house to the degree necessary for solar heating, it seems, "can't be done." That was a setback, for a while.

Then we heard of a log house in the area that had been built unconventionally for greater insulation value. Its logs had been split into an "outside" half and an "inside" half. The two halves had then been applied, inside and out, to a conventionally constructed and insulated stud wall. We floated this idea by Dennis, who runs Southface Energy Institute in Atlanta, the region's main repository for green construction know-how, and by Bill Browning, who created Rocky Mountain Institute's green construction practices, and they agreed it could be done.

Bill, however, insisted the stud wall should be built with two-by-six studs, rather than the usual two-by-fours, and should be stuffed with insulation. Dennis suggested that exterior walls should have the further features of a layer of roofing felt applied to the plywood forming the outside of the stud wall, for air and water tightness, and gypsum board applied to the inside of the stud wall for still greater air tightness. Dennis is a stickler for air-tight walls, windows and doors. He believes porous walls, windows and doors provide the greatest potential for heat loss by way of cold air incursion. Log "halves" could then be applied, or clad, outside and inside. Outside log cladding would be applied to one-inch-deep vertical "sleepers," strips nailed into the felt-covered stud wall, to create a "drip gap" so any rain water that penetrated exterior logs or chinking would run down the gap to an opening at the bottom, where walls rested on foundation. The outlet of the gap at the foundation would be covered with wire mesh to prevent small rodents and birds from nesting in the drip gap. The resulting appearance with this unconventional approach would be exactly that of solid logs with chinking and dovetailed corners, but the wall's insulation value would exceed R20 and its overall thickness would be about 12 inches. This became the wall specification.

Pat was thinking ahead to what kind of logs. She searched the Internet and discovered the concept of harvesting dead standing trees for logs. One firm in particular caught her eye, Wind River Log Homes of Telluride, CO. It guaranteed the use of dead standing Engleman spruce trees, left standing by a beetle infestation in Wyoming some 40 years before. We talked extensively by telephone with Jamey Schuler, Wind River's president (and sales manager), about our "split log" idea, and he confirmed that Wind River could accommodate us. Then we went to Colorado to visit the Wind River yard. Jamey's partner, Rick Warner, took us to Wind River's showcase installation, the Roaring Forks Resort development near Aspen, and we were sold. We did impose one condition—that Rick must come to Lost Valley to supervise the beginning of log erection and to be sure that the carpenters, who had never done this before, were using the right methods. Wind River agreed and we gave them a set of plans for their take-off and quotation, which we promptly accepted. We are proud that no live trees were taken to supply us logs.

THE DESIGN DETAILS

Log shapes, sizes and source settled, and with wall construction details determined, Jack and Chris went to work on design. Jack quickly produced an initial floor plan and a perspective drawing for us to approve or reject. He "nailed" the perspective; it never needed to be changed and the finished house is depicted quite accurately by that very first drawing. Jack really does do pretty design. As for the practical and the technical features, I asked Bill Browning to look at the site with me

and outline a broad-brush concept for harnessing the sun for electricity and heat, a concept we subsequently followed without deviation. However, finding someone to design in detail a photovoltaic system for electrical power and a radiant floor heating system supplied by roof-mounted solar collectors was no small undertaking. After futilely casting about through my Atlanta contacts, I called another eco-friend, Dan Nall with the Flack + Kurtz engineering firm in New York City, and he recommended two engineers he knew, one for the PV and the other for solar heat. He also agreed to stay involved as an advisor on the PV side. Soon thereafter, I retained Bob Ellington and John Hardesty, who immediately engaged with Jack to coordinate their designs with his.

Dennis, too, continued to offer suggestions, especially on energy conserving structural details, and we followed most of them, though not all. For example, he had definite ideas about the crawl space underneath the house and thought it should be paved, made air-tight and insulated. I balked at this, and compromised by insulating the house's first floor (above the crawl space), covering the crawl space with plastic and plugging the code-required ventilation dampers with Styrofoam blocks. He also recommended a door to close off the fireplace. Though this undoubtedly would have enhanced indoor air quality, Pat rejected the idea because of the too-sleek appearance, and we opted to keep it open and rustic, but screened. The chimney draws well, so fumes have not bothered us.

The most drastic departure from conventional design, aside from the wall construction, was the elimination of the usual heating, air conditioning and attendant ducts; and, instead, the use of radiant heating coils in the floor and open windows. Air conditioning at 3,000 feet elevation (the exact first floor elevation) could be supplied quite adequately by natural ventilation, with help from ceiling-mounted fans (high efficiency and quiet—noise means inefficiency). Heating coils, to circulate fluid warmed by the sun, would be encased in two inches of cement, screeded between wooden stringers about 18 inches on center, sandwiched between the plywood sub-floor and the finished floor. The wooden stringers would be needed for fastening down the yellow pine finished floors.

We specified windows for thermal efficiency, double-paned on the south, east and west sides, triple-paned on the north side. We chose casement windows for selected windows, such that opening one side or the other could facilitate catching the breeze, whichever direction it might be blowing.

For insulation, we selected blown-in natural cellulose, an economic decision we may regret eventually. Isonene™ synthetic insulation was new to the construction trade in western North Carolina and the quotations came in very high. In retrospect, it might have been a better choice in spite of the cost because of cellulose's vulnerability to water; and long range, because we aren't sure about cellulose's "nutrient value" to insects or the continued effectiveness of its treatment for insect repellency.

We paid a lot of attention to drainage and potential erosion. Toward the end of the construction stage, we would build extensive retaining walls to create a parking area and to control run-off. We would also fashion catchment basins, coordinated with drainage piping to prevent rapid run-off.

A screened porch on the home's south side provides a glorious view of the valley. Five solar collectors are mounted on the red metal roof.

CUSTOM CONSTRUCTION

An absolutely critical choice that had to be made early on was who should be the general contractor (GC). We had heard horror stories about efforts to employ Atlanta-based GCs in the mountains of western North Carolina. The locals, it seems, don't take kindly to outsiders taking their jobs. So we focused in the Highlands area, interviewing a total of five candidates. We settled on Lupoli Construction Co., mainly because we judged owner John Lupoli to be the most flexible in being able to deal with the unconventional, and very custom, aspects of off-the-grid construction. John and his associate John Williams became valuable partners in our very, very custom project, which we undertook together with a cost plus agreement on a handshake.

Pat also selected her landscape architect, Sherman Runions, to begin to plan and execute the landscaping, starting with the wildflower meadow, and to care for the critical trees as they faced the shock of construction activity. The summer of 2003 was to bring a profusion of wildflowers. With the unusually wet weather, the meadow, sown with some 33,000 plants, produced a full year earlier than expected.

As construction got underway in November 2001, Pat and I turned our attention to such issues as appliance selection, design specification for power and heat and furnishings. I undertook, with Dennis Creech's help, to do a detailed electrical load calculation. Dennis did a theoretical heat load calculation, too, as Jack and Chris's plans materialized. These efforts eventually resulted in selection of a 3.9 kWp (kilowatts at peak sun) PV system and five roof-mounted, four-foot by 10-foot solar collectors, with appropriate auxiliary systems (described later). Pat took on the other challenges, shopping relentlessly for the most energy efficient "whatevers," though she always gave appropriate weight to function and appearance, too.

Meanwhile, Lupoli's first order of business was to drill a well for the water supply and obtain septic system approval, the latter requiring a Health Department permit. Believe it or not, John Lupoli retained a "witch" to divine where and how deeply to drill. A local phenomenon, Gail Fisher was said to have a 100 percent accuracy record, and she sure enough found our spot, perfectly located up the slope toward the western ridge. She predicted water at 865 feet depth. She was right about location, but wrong about depth. We found water at 780 feet, with a flow rate of 50 gallons a minute—enough for the subdivision we would never build with a conservation easement in effect. John Lupoli said that he would have stopped drilling at 700 feet without Gail's prediction—a small fee, well spent, for her insight. The water pressure from the aquifer we had tapped pushed the water level in the well to about 50 feet below the surface. This was a big help when we got to sizing the well pump and motor, which would run off sunlight.

The well was equipped with pump, motor, pump housing, pressurized bladder for constant pressure supply and piping to the house. Water quality, tested by the Health Department, turned out to be perfect in purity. The pump is the largest single user of electricity, so low water usage toilets have a double advantage. We would learn to be sensitive to water usage of all kinds, realizing that our water is a double gift from sunlight (from the hydrologic cycle and via the photovoltaic system).

The drainage field for the septic system was located down-slope from the house and the well, but at an elevation well above Shoal Creek flowing through Lost Valley. We hardly give the septic field a thought now, as the forest progressively covers the scars from its installation. ●

THE DESIGN CRITERIA

Our initial criteria: 2,500 square feet of heated floor space; two stories; five bedrooms (small); large living room with fireplace for gathering family and friends (complete with Engleman spruce beams overhead); landing area at the top of the stairs with television for a guest retreat, study to accommodate sofa bed, desk and computer; kitchen with all the normal appliances; laundry room (near the kitchen and the back door) with adjacent toilet; four full baths; powder room; plus two-car garage with storage closet; basement mechanical room; and a big screened porch on the south side, facing down the valley. Rooms to be small, except the living room, which must to be ample enough for dining, too; all carefully designed for no wasted space—very much as a ship's space is organized (an apt comparison, by the way). Every room to have cross ventilation, designed for windows to stay open in warm weather; with ceiling fans in all bedrooms, living room and on the porch. Floors to be yellow pine, for which Pat even found the source. And, oh yes, a red metal roof with standing seams, for which Pat also found the source; and lots of stone work on foundations, chimneys and retaining walls.

Ray Anderson is founder and chairman of the board of Interface Inc., Atlanta, GA. He is the 2001 recipient of the George and Cynthia Mitchell International Prize for Sustainable Development awarded by the National Academy of Sciences, and his book, Mid-Course Correction (Chelsea Green, 1998) describes his and Interface's transformation to environmental responsibility.

NEXT ISSUE: In the second installation of this series, construction of the home gets underway and hundreds of more decisions are required.

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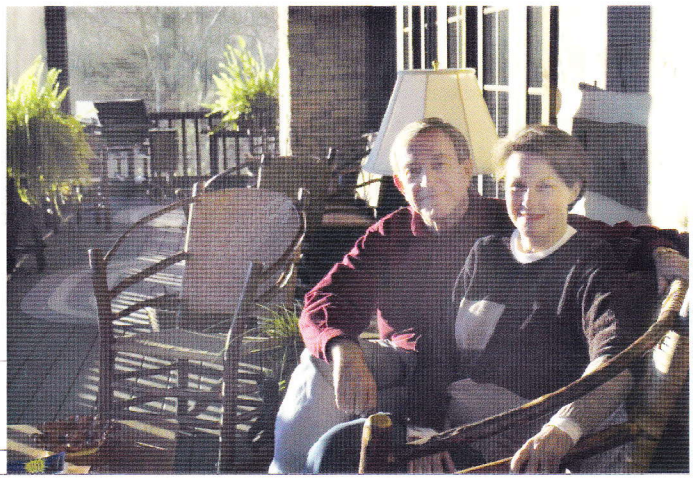


OFF THE GRID in Lost Valley part 2

The continuing story of one couple's desire for "gracious living" in an earth-friendly home in the Southern Appalachian mountains.

OPPOSITE **Though some experts doubted they could do it, Ray and Pat Anderson were determined to build a "gracious" log cabin "off the grid" in Lost Valley. Construction, from beginning to end, required a year and a half.**

OPPOSITE BOTTOM **The house was sited atop a magnificent knoll; the south side of the screened porch was oriented to face a breathtaking view. Solar collectors also were placed on the south side of the house in order to favor the afternoon sun.**

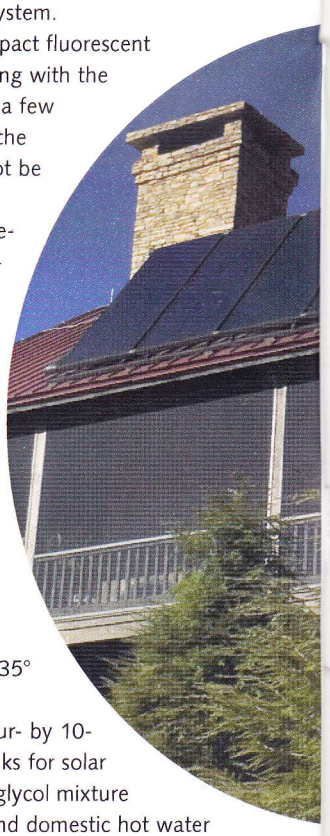
EDITOR'S NOTE: *In the January issue, the author began his story of a search for the ideal location to construct a log home in the mountains not far from Dalton, GA. After months of exploring, Ray Anderson and his wife, Pat, chose a place near Highlands, NC, in a place called Lost Valley. The first article explored the initial decisions that were made in planning, designing and constructing their new eco-friendly log home, one they were determined would be both "gracious" and "off the grid," even though some experts doubted it could be done. This article profiles the myriad of decisions that subsequently followed.*

Construction finally began in November 2001! With erosion shielding silt fences in place to protect Shoal Creek from construction run-off, and house plan and topographical survey in hand, we positioned the house and decided its orientation astride our narrow rib of land and atop the magnificent knoll that first took our breath away. We marked three major trees for protection: a sourwood to the northeast, a maple to the southwest (to shade the house's western wall from summer's afternoon sun) and a magnificent 24-inch diameter, 60-foot-tall yellow pine to the south. We then slotted and oriented the house among them. The south side of the screened porch was oriented to face about 10° west of true south. The valley extends in that general direction and so this would be our primary view.

That orientation also gave the best solar exposure. The ridge that defines the east side of Lost Valley has high trees on that side, which dictated that we favor the afternoon sun for PV and solar collectors. So the PV site was selected on the south side of the house at ground level, with the same orientation (parallel with the house), while the solar collectors were assigned to the south-facing roof, with the same 10° west-of-south orientation.

As construction proceeded, major subcontract items included:

- SEPTIC SYSTEM: as approved by the Health Department; capacity 600 gallons a day (enough for a small hotel).
- FOUNDATION: digging, forming and pouring concrete footings and walls, including providing a basement area for the mechanical room.
- CARPENTRY: framing, exterior sheathing, erecting logs (inside and outside), installing doors, windows, floors and trim moulding.
- STONE WORK: foundation façade, two fireplaces and chimneys (one in the living room, one on the screened porch), outside walkways and extensive retaining walls to control erosion.
- INSULATION: blown-in cellulose for exterior and interior (for sound deadening) walls; also floors and ceilings.
- SHEETROCK: providing Dennis's air tightness and a cavity for the insulation.
- ROOFING: steel, standing seam construction and red in color to meet Pat's requirement.
- PLUMBING: all the usual for water usage and sewerage disposal, plus interfacing with the solar heating system.
- ELECTRICAL: all the usual, but with compact fluorescent lighting wherever feasible, plus interfacing with the photovoltaic power sources and adding a few efficiency "wrinkles" such as timers on the bathroom exhaust fans so they could not be left running inadvertently.
- LOGS: shaped (nominally 11-inch by five-inch cross-section), then split into three-inch and two-inch widths, cut to length, and numbered by Wind River to facilitate precise location and installation.
- PHOTOVOLTAIC: 3.9 kWp PV array, battery bank, inverter for AC current, propane-powered back-up generator and controls. The PV array included 26 panels (expandable to 32), mounted on an aluminum frame, which is anchored in concrete footings, and fixed at 55° from the vertical (the complement to Lost Valley's latitude of 35° north), and facing 10° west of south.
- SOLAR HEATING: Five roof-mounted, four- by 10-foot solar collectors, two 110-gallon tanks for solar fluid (a water and non-toxic propylene glycol mixture that prevents freezing on cold nights) and domestic hot water storage, heat exchangers, supplementary heat (propane), circulation pumps, buried coils for radiant floor heating (pressure tested for air tightness at 100psi), and controls for nine thermostatically regulated heating zones, including one for the separate battery enclosure in the mechanical room.
- APPLIANCES: all electric, except propane gas for stove, oven, grill and clothes dryer; everything selected for best efficiency, commensurate with reasonable convenience, including such luxuries as trash compactor, instant hot water dispenser, microwave oven and garbage disposal. As Steven Strong had said, "For gracious living in the mountains."
- CABINETS AND CLOSETS: all conventional.
- GARAGE DOOR: electrically operating, façade constructed from quarter-inch-thick Engleman spruce salvaged from the log splitting procedure, sanded and stained to match exterior logs exactly.
- SATELLITE: one dish for both television and computer (amazingly fast, with perfect television reception, down-linking and up-linking



for the computer).

- **TELEPHONE:** our other concession to the grid, telephones are on a land line for the security system's sake. In contrast to the power company, the telephone company made us an offer we could not refuse: buried land lines, installed for $135! Go figure.
- **LIGHTNING PROTECTION:** an afterthought, but an invaluable peace-of-mind addition. (While waiting for the system's installation we saw a photograph on the front page of the local newspaper of a million-dollar home going up in blazes from a lightning strike.)
- **PAINTING, STAINING:** for every square inch of surface, inside and out, to meet Pat's exacting shade requirements, including the chinking, a rubberized cementitious material that moves with the logs, rather than cracking or separating as the logs react to temperature or humidity changes. Even the aluminum PV framework is painted dark green to help it "disappear."
- **PAVING:** 1,000 feet of asphalt, 10 feet wide, for a very steeply sloping, winding driveway.
- **PARKING:** rocks and pebbles to provide a porous parking area, together with drainage piping to minimize run-off.
- **LANDSCAPING:** to create a minimum maintenance yard, meaning no grass to cut, and to plant a half-acre wildflower meadow alongside Shoal Creek. We have taken special care to preserve the small wetland that buffers Shoal Creek from the wildflower meadow and captures run-off from the approach road.
- **FENCING:** at precipitous edges along the mile-long, winding approach road and driveway, for safety and to say "Welcome" to our approaching guests.
- **GATE:** at the driveway entrance, access code-controlled, and also solar-powered by its own small, stand-alone array.
- **SCREENING:** windows and porch (including underneath the porch to prevent insect entry through the cracks between floorboards, which are necessary for drainage).
- **SECURITY:** every window and door protected.

Construction, from beginning to end, required a year and a half, though we moved furniture in and began to use the house after a year (with work going on around us). Near the end of construction, there was an especially amusing moment that epitomized the entire experience. The guard rail for the rather elevated screened porch was yet to be built. Discussing its construction details with our general contractor, John Williams, we asked him how we should think about this, and he replied that it was really a code issue (as to height and spacing between the vertical slats). So we asked what the consequences would be if we varied from code. He answered, "You won't get an occupancy permit." We then asked what the consequences would be of not getting an occupancy permit. He blushed, realizing the absurd irony of his answer: "The power company won't turn on your power." We had a good laugh, and then agreed to his building the railing to code.

During the first winter of use, the big yellow pine tree on the south side cast an energy-robbing shadow on the roof-mounted solar collectors, and we decided not to tolerate this for another winter. With the tree's removal, we expect significantly less usage of propane for supplementary hot water heating in cold weather. Thus, we will release far less CO_2 from burning propane than the pine tree's carbon sequestration

RIGHT **Special care was taken to harvest no live trees for the home's exterior; its split log construction provides "thermal lag" which, enhanced by the air-tight sandwiched insulation, enables the house to hold its temperature very steadily in all kinds of weather.**

OPPOSITE **The furnishings Pat chose for the home are both comfortable and "mountainy," Anderson says, and appear as if they "truly belong" in their setting.**

capacity we have sacrificed. That magnificent southerly view from the screened porch, frankly, is much enhanced, too, by the absence of the 24-inch tree trunk in the sight line down the valley to Georgia.

The buried propane tank, representing our primary reliance on the outside world for utilities, was filled for the first time on August 15, 2001, requiring 850 gallons. Subsequent refills over the first year totaled 1,354 gallons with an average use of 3.7 gallons a day. With work still going on during the first winter and the tree shadowing the solar collectors, propane usage was initially unusually high, but declined to nominal amounts for cooking and clothes drying during spring and summer as the sun supplied practically all the energy for domestic hot water. We expect significantly better performance in the winter of 2003.

The very slow "thermal lag" of log construction, enhanced by the air-tight sandwiched insulation, enables the house to hold its temperature very steadily in all kinds of weather. The night's coolness lingers through hot summer days, and the day's warmth lingers through cold winter nights. We had heard this about logs, and it has proven to be true. Radiant floor heat is nice, too, and very different. The floor never feels really warm; it just never feels cold. Radiating upward, the gentle heat negates the normal settling of cold air, and an entire room is kept uniformly comfortable from floor to ceiling.

> "We love our log house in the mountains—**off the grid**, in our own forever wild slice of the watershed called Lost Valley."

The back-up electricity generator did not have to run at all the summer of 2003 as the PV system met all our electrical needs, in spite of an unusually cloudy and rainy summer. At peak summer sun, the PV system generates about 52 amps of direct current to the batteries, while the house's usage fluctuates typically between three and about 20 amps of alternating current, after some 15 percent is lost in conversion: three amps in shutdown mode, usually around six to eight amps in normal operation, and as much as about 20 amps (sometimes more) with momentary surges if several motors come on at once.

Large electricity users include the well pump, refrigerator-freezer, garbage disposal, compactor, instant hot water dispenser, microwave oven, garage door and hair dryer (strictly limited to models with 600 watts, rather than standard 1,800-watt units). However, all these run for relative short durations (amp-hours is the key usage metric).

Compact fluorescent lights and ceiling fans are not large users, though they stay on for extended periods. Average daily electrical usage, occupied, is about 20 kWh; unoccupied about eight kWh, both pretty much as originally calculated. With average sunshine, the PV system supplies this without help from the generator; and several days without occupancy assure that the batteries recharge fully. Setting the generator to come on optimally was a particularly important exercise. One wants to give the sun a chance all day long, but not let the batteries be over-drawn. One also has to be conscious of generator noise during sleeping hours. So we set operating hours from sundown to bedtime, and trigger points for low battery voltage that allow the sun to work over a wide, but safe, range of battery voltages.

Off the grid, there is no garbage collection, either, so whatever garbage we accumulate, we haul out. We separate glass, aluminum and newspapers for the recycling center, which is handily located a mile or so from the entrance to Highland Gap.

Furnishing a new home from scratch is a very big undertaking, and Pat did it by herself and with relish. I cannot even begin to do justice to her efforts. She picked every piece of furniture, every picture, every picture frame, every mirror, every fabric (draperies, upholstery, bedspreads and curtains), every linen item, every lamp, every light fixture, every vase, every bookend, every house plant, every rug, including the all-weather rugs for the porch, every accessory, and all the paint colors.

We love our log house in the mountains—off the grid, in our own forever wild slice of the watershed called Lost Valley. We enjoy it mostly for weekend getaways, about every other week. It accommodates guests well, too, as many as 10 at a time, plus us. We are happy with the space, even the small bedrooms, the arrangement of rooms, the "mountainy" furnishings, the appliances, the PV, the solar heat and the natural cooling during summer, with occasional help from the ceiling fans. Nobody has run out of hot water yet. And, thanks to Pat, nobody has gone hungry or had to sleep on dirty sheets or use dirty towels, either.

In a word, it works! ●

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