Vermont's GREEN Welcome Center

The butterfly ginger, umbrella plants and water parsley are flourishing in the sparkling octagonal greenhouse of the Sharon North Welcome Center overlooking Interstate 89. Red cana lilies are blossoming and tendrils of German ivy trail down the sides of circular planter-tanks. A young couple strolls around the greenhouse catwalk above the foliage, following interpretive signs that explain that the plants and micro-organisms are recycling wastewater in this "Living Machine" natural water treatment process.

A few yards away, in the main hall of the welcome center, a gentleman in a blue plaid shirt peruses names etched on the slate and glass honorific column at the center of the room. The names of the 7,236 Vermont men and women who served in Vietnam during that long war are inscribed on this column. The names are bathed in natural light from skylights overhead. As he reads, a gentle breeze of warm air from the top of the column heats the room.

Outdoors, two women are quietly visiting the Vermont Vietnam Veterans Memorial, a granite monument engraved with the names of the state's 138 men who died in the war. The monument is the focal point of a stone amphitheater, a place for private or group remembrances. The memorial is visited year round; in winter, the walkways leading to it and encircling the amphitheater stay clear of snow and ice without anyone lifting a shovel.

The Sharon North Welcome Center, just past mile marker eight on Interstate 89, is unique among highway rest stops. It is an attractive, efficiently run hospitality center with free Wifi, free coffee and information for travelers about Vermont products, businesses and attractions. It is also home to the Vermont Vietnam Veterans Memorial, a cherished tribute to Green Mountain State servicemen and women. In supporting those two uses, the center has a third distinction – it is a model of environmental sustainability and natural resource conservation.

Although stone on the outside (local stone, in fact), the Welcome Center is green. The wastewater from its public bathrooms is not used once and then discarded. It is recycled through the "Living Machine" housed in the center's gorgeous greenhouse and reused for flushing – a considerable water savings for a building that frequently gets upward of 1,500 visitors a day. Instead of traditional heating and air conditioning, the building has a geothermal system that taps the temperature of bedrock deep in the earth to keep the center comfortable for the traveling public. Out of sight, water circulating through 24 wells, each 420 feet deep, lowers the operating costs of the center and reduces its production of greenhouse gases by thousands of pounds each year. The geothermal system also melts snow and ice off the walkways. For the energy-saving icing on the cake, natural light and energy efficient light bulbs reduce this building's carbon footprint.

A Brief History

The roots of this green center reach back to the 1960s, when interstate highways were being built across the country, including in Vermont, and the Vietnam War was raging. Vermont's Interstate 89 was completed in 1970, allowing motorists to travel all the way from the New Hampshire border at White River Junction to Canada on this federally-funded four lane highway. Gas cost 34 cents per gallon then. Rest stops like the modest building on the northbound lanes at Sharon were expected to get 20-40 visitors a day.

In 1981, Interstate 89 was named the Vietnam Veterans Memorial Highway. The following year, a monument, the Vermont Vietnam Veterans

Memorial, was dedicated at the Sharon North rest area. (See sidebar)

By the mid-1990s, Vermont's rest areas were aging, and not all gracefully. Traffic had increased exponentially and the centers were getting far more use than in their early days. Hewn out of the sides of mountains, the highway and rest areas offered some magnificent views. The thin soils and ledge of the sites, though, were not suited to septic disposal, and rest area systems were stressed. Built before the Americans with Disabilities Act, the centers were not designed with the ramps and wide doorways that allow wheelchair accessibility.

For a short time, the powers in Montpelier considered closing Vermont's interstate rest areas in response to the big problems and likely big money to fix them. Vermont's Vietnam veterans took to the phones and the halls of the State House to remind lawmakers of the memorial at the Sharon stop. Vermont legislators and Governor Howard Dean soon pledged to keep the memorial in place and to involve the veterans in planning a new center.

"How do we continue our commitment to honor the veterans at this site?" was the challenge, explained Ed von Turkovich, Director of Vermont's Information Center Division. "The site posed some vexing problems and forced people to think out of the box."

The "Living Machine"

Dealing with the center's waste from its restrooms was at the top of the list of problems. Not only were the site's soils inadequate for traditional septic, there was no nearby municipal system to accept it. But before Sharon got on the drawing board, two other proposed rests stops (both in Williston) startled lawmakers into some bold planning.

"We realized that [those two areas] included no Vermont materials and no state of the art energy technology. They had no renewable energy designs or systems that we had been encouraging in other state buildings," recalls Senator Vince Illuzzi, who was Chairman of the Senate Institutions Committee. Illuzzi and others wanted something more far-sighted for Sharon.

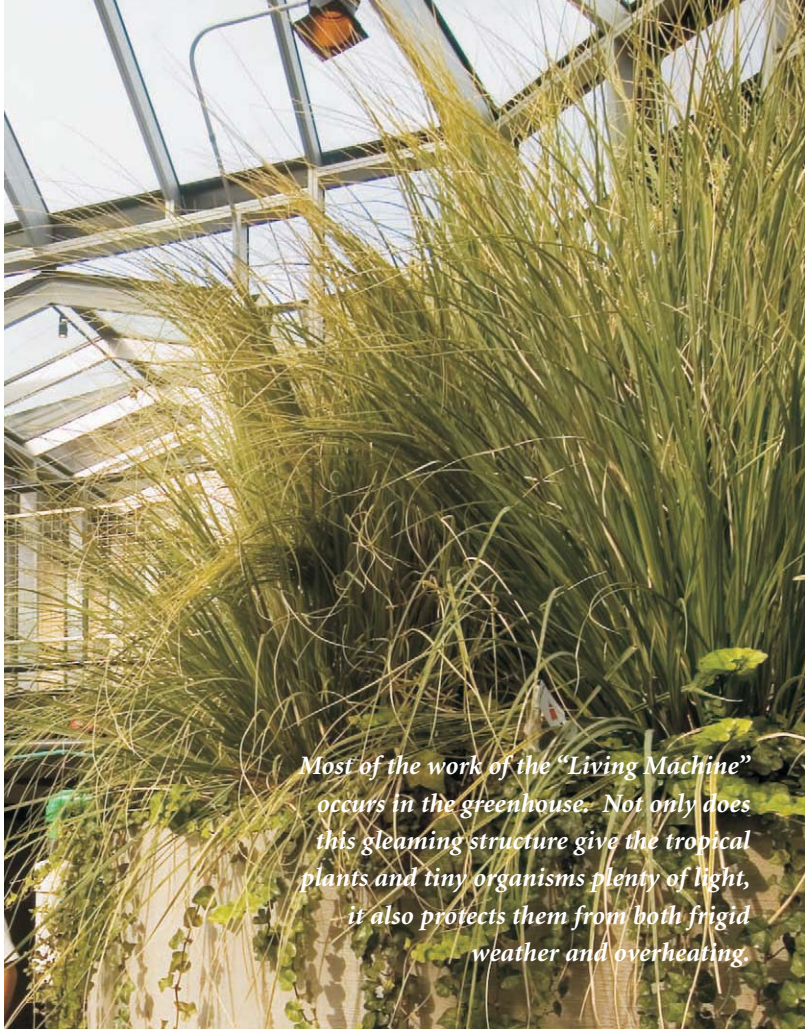
"Tom Torti, the Commissioner of Buildings, suggested we work toward making this a green rest area," Illuzzi said. Planning started, he explained, and "we incorporated every conceivable idea that would work into it."

For a solution to the septic, they didn't need to look far. Biologist John Todd, Research Professor in the School of Natural Resources at the University of Vermont, is a pioneer in the field of ecological design and engineering. Todd and colleagues had developed a wastewater treatment system that they called the "Living Machine."

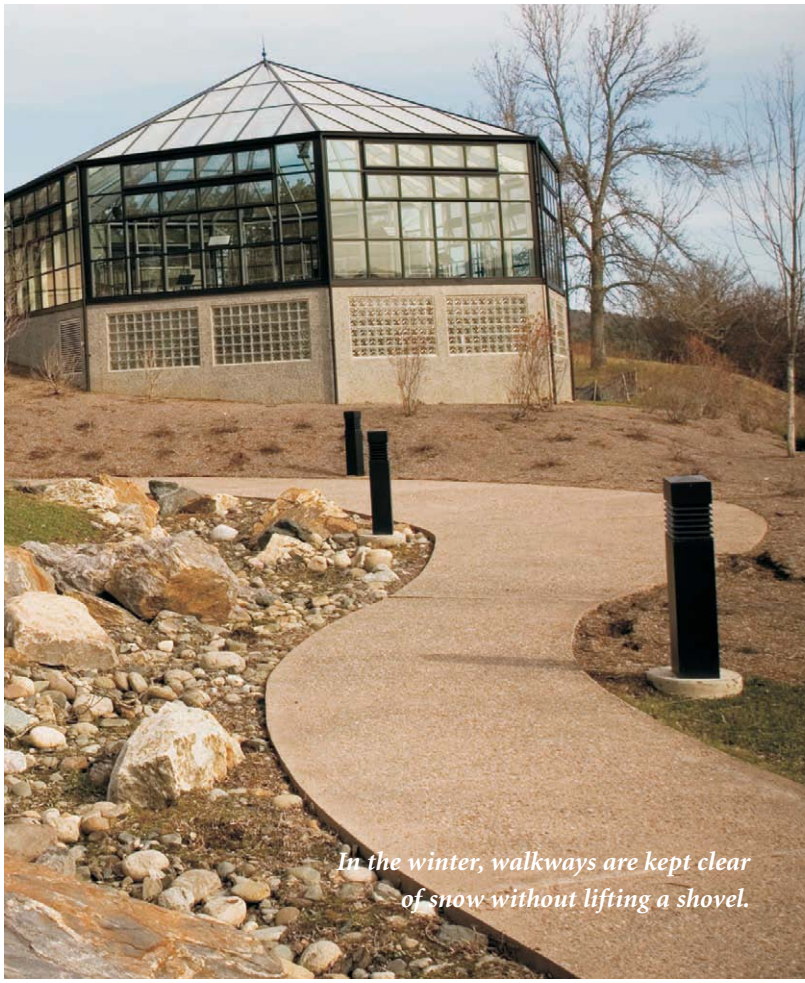
The "Living Machine" is based on water purification processes that occur naturally in wetlands and ponds. In nature, living plants, bacteria, snails and other organisms cleanse water of pollutants. In a "Living Machine," a series of ecosystems, plants and organisms living in tanks, is created to treat contaminated water. "Living Machines," now patented, can handle a variety of pollutants. They are used in industrial plants as well as for sewage treatment.

The "Living Machine" designed for Sharon makes it possible to save about 77 percent of the water pumped into the building. With over 200,000 visitors there last year, this amounts to a lot of water conservation. "Blue water" signs in the rest rooms are often travelers' first clues that something environmentally progressive is happening here.

"From the restrooms, a lot of people go to the door of the green-



Most of the work of the "Living Machine" occurs in the greenhouse. Not only does this gleaming structure give the tropical plants and tiny organisms plenty of light, it also protects them from both frigid weather and overheating.



In the winter, walkways are kept clear of snow without lifting a shovel.

▲ *In the greenhouse, visitors tour the "Living Machine" on a metal walkway above the plants. Signs explain the ecosystem processes occurring beneath them.*

▶ *"I take great pride in this system." Steve Kribstock, technician who maintains the "Living Machine."*

house and have a questioning look," said Louise Calderara, Travel Representative for Vermont, who works at Sharon North. "I explain that it's a 'Living Machine' and tell them they can go out to see it."

Most of the work of the "Living Machine" occurs in the greenhouse. Not only does this gleaming structure give the tropical plants and tiny organisms plenty of light, it also protects them from both frigid weather and overheating. The greenhouse is glazed with insulating glass and has windows equipped with temperature sensors so they open and close automatically.

In the greenhouse, visitors tour the "Living Machine" on a metal walkway above the plants. Signs explain the ecosystem processes occurring beneath them. People often linger there, surprised that in this warm, humid environment, no unpleasant smell betrays its wastewater function.

The first step of the "Living Machine" process occurs out of sight in a traditional septic tank. From there the liquid proceeds to closed reactors where waste-eating bacteria degrade organic compounds into simple organic molecules, taking the odor out along the way. From there, the effluent flows through three open hydroponic reactors. Each of these is covered with plants whose roots reach into the water and provide oxygen and living space for microbes. Copepods, paramecium and amphipods living there reduce organic waste and convert ammonia to nitrates.

After being bubbled and munched in the reactors, the liquid goes into a clarifying tank where microbial communities settle out from the treated water. The solids go back to the septic tank. The liquid moves on for final polishing where it is chlorinated to kill remaining bugs and then de-chlorinated. The clean recycled waster is then dyed blue and sent back up to the toilets, not the faucets, to begin its journey again.

"I take great pride in this system," said Steve Kribstock, the technician who maintains the "Living Machine." Kribstock is at the rest area several times each week, running water tests, trimming the plants, checking the health of the colonies and monitoring pumps. He answers lots of questions while he's there. Besides interested travelers, school groups and university students often come to see the "Living Machine.

Geothermal Heating and Cooling

Visitors see the "Living Machine" at work, but they feel the work of the center's geothermal heating and cooling system. Much of this energy efficient system is deep underground. Its other components, the pumps, pipes, and compressors, are in an impeccably maintained mechanical room directly beneath the main hall of the center.

Brian Craig, who has been with Vermont Buildings and General Services for 30 years, is the maintenance specialist at Sharon and at other state sites. He is this system's resident expert.

At the heart of the geothermal system "is constantly moving water," Craig explained. Each of the 24, 420 foot deep wells, he said, "is capped and plugged at the bottom. We're not pulling water from the ground through them. Each has a loop from the building to the bottom of the well and back." A solution of water and glycol flows steadily through those loops.

Sharon's geothermal system takes advantage of the temperature of subsurface bedrock. Around 55 degrees Fahrenheit year round, the bedrock is warmer than outdoor temperatures in winter and cooler than summer temperatures. The system exchanges heat above ground with heat below ground.

The system works something like a refrigerator or series of refrigerators. For heating, from its trip underground, the water goes through a process of compression, evaporation, condensation and expansion. Air warmed by that process is vented to heat the welcome center. While air is heated though this process, the water loses heat. The water then flows back down the well where it again absorbs heat from the bedrock and continues on in its cycle.

The air conditioning system is similar but in reverse. In this process, instead of the heat from the air cooling system being vented into outside air that is even hotter, it is carried by the water back down the well. Besides controlling the temperature of the center's air, the geothermal system also heats the tap water and, with underground lines, melts snow from walkways.

The Environmental Protection Agency has called geothermal heating and cooling "the most energy efficient and environmentally sensitive of all space conditioning systems." Sharon's system has two main environmental benefits. First, even though it uses electricity, its overall energy consumption is less than that of a traditional oil or gas system doing the same heating and cooling. Its second benefit is that its operation produces smaller quantities of greenhouse gases, especially carbon dioxide, than would be produced in a traditional system.

The Vermont Vietnam Veterans Memorial

Their eyes are steady and they look so young, the eight Vermont servicemen whose photographs from Vietnam are on banners hanging above the honorific column. One leans on a fence, another holds his rifle. They remind visitors that there was a face of a son or daughter for every one of the 7,236 names engraved on the column beneath them, Vermonters who served in Vietnam, including the 138 who perished there.

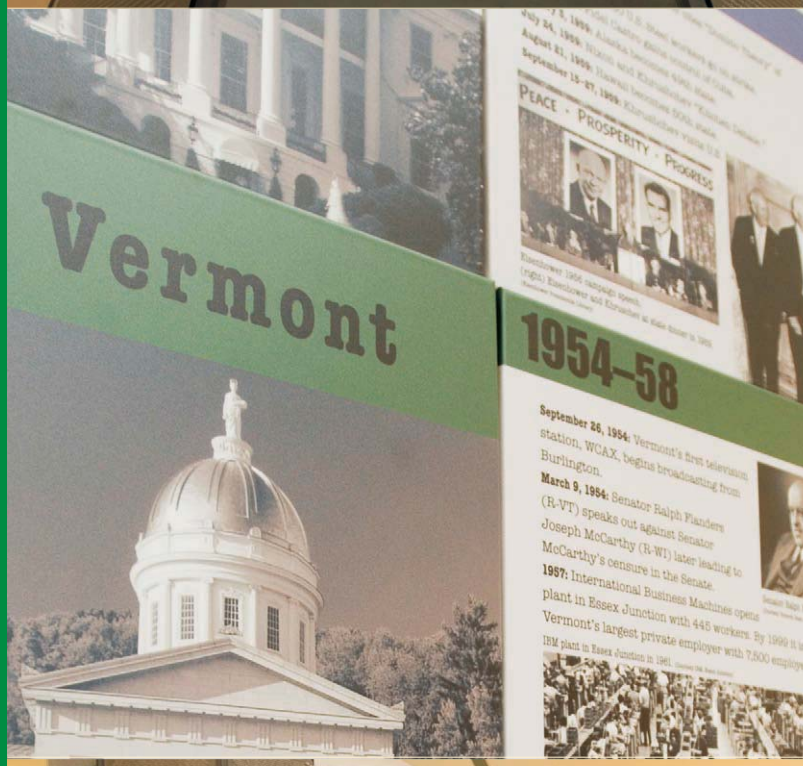
The Vermont Vietnam Veterans Memorial is the centerpiece of the Sharon North Welcome Center. With its granite monument and column, it honors the sacrifice and service of the state's men and women in the military. The center also informs, with a display case, photographs and a triple timeline of national, Vermont and Vietnam events. A quick history refresher, the timeline touches on the beginning of US involvement in Southeast Asia and reasons for our military engagement there. Tallies on panels show the war's escalation from the first US casualty there in 1957 through 1968 with 537,377 US troops and 16,592 US deaths, and on to the 1975 evacuation of the US Embassy.

A quarter of a century ago, the Vermont Vietnam Veterans Memorial was dedicated at the Sharon North Welcome Center. This was the first state-sanctioned memorial of its kind in the country, and its dedication preceded that of the Wall in Washington DC. The site was chosen partly because the views reminded veterans of Highway One in Vietnam and partly because it was located 138 miles from the Canadian border, matching the number of Vermonters who died in the war. The rest area was also public and prominent and not far from the Veterans Administration Hospital in White River Junction.

On Memorial Day, 1983, a tradition of an all-night vigil at the site commenced. Every year since then, veterans, families, and friends have gathered at the monument to lay a wreath, light candles and remember.

Vermont Vietnam veterans played a central role in shaping the new center. With their suggestions, Bennington architect Timothy Smith developed a plan that includes an outdoor setting for the monument, with space for ceremonies as well as private observances, and indoor features like the column and areas for educational displays.

Respect for the veterans and their service pervades the site. Inserted in the stone wall framing the monument are 138 marble blocks. Candles are lighted on them during the annual vigil. Inside, photographs and an ongoing slideshow of Vietnam give visitors vivid images of Vietnam. Issues of "Stars and Stripes," ration cans, uniforms and spent shells are on display in a glass-fronted case. "It is awesome," said John Miner, Chairman of the Vermont Vietnam Veterans Council, about the new center. "You should hear the phone calls I get from people who are so proud seeing it. I've had comments from around the country. I truly believe that the number of people stopping there is now more than ever." *(Continued on page 61)*



(Continued from page 30) Even though it is not using any oil or gas on site for its systems, the Sharon center consumes some fossil fuels through its electrical use. Vermont's electricity comes from a variety of sources including nuclear, hydro and fossil fuels. This mix, combined with Sharon's energy conservation, keeps the centers carbon dioxide contribution lower than it might have been.

A Green Center

With a few calculations, Dave Burley, Director of Engineering for Vermont's Buildings and General Services, came up with estimates for the Sharon center's greenhouse gas production. If the building had used traditional heating and cooling, each year approximately 273,000 pounds of carbon dioxide would have been produced by its electrical use. Another 232,000 pounds would have come from its oil consumption, totaling 505,000 pounds. With the geothermal system, it produces about 325,000 pounds annually, about a third less.

Beyond its geothermal and "Living Machine" systems, the Sharon center is green in other ways. Local stone was used to face the building and memorial amphitheater. Energy efficient light bulbs supplement natural lighting, and the building gets some passive solar heating.

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"People are amazed by what we have here," said Calderara, who is at the Sharon North Welcome Center five days a week, helping travelers with directions, acting as an ambassador for the state, and enriching visits here with information about the Vermont Vietnam Veterans Memorial and this environmentally friendly facility. "You meet people from around the country and around the world here," she said, "and they take these ideas back home with them." ◆