

The vibrant, gentle whimsy of Solman Bill Cirrito's solar-powered, kinetic sculptures will make you smile. Guaranteed. Ask any owner of his unique, colorful art. Colored orbs and pointing fingers gracefully glimmer and turn; hand-hammered, tropical fish swim in open-aired aquariums; iridescent, silver butterflies hover; Sol-Dragon bird feeders slowly revolve; water burbles in Sol-Flower fountains. Using photons as energy, Bill Cirrito is creating an interactive metal Wonderland through the ingenious integration of science and art.

"I believe science and art are intertwined," Solman explains the melding of his twin passions. "Each one reflects and inspires the other."

For Bill Cirrito both are creative processes. Following a five-year stint as a successful wood sculptor, he spent the next fifteen years designing patented and award-winning photovoltaic systems, helping to propel the emerging technology of solar energy forward into the twenty-first century.

"Photovoltaics is the purest solar energy," he declares. "It is the most magical. Imagine the direct conversion of sunlight—a completely free and unlimited energy source—into useable electricity utilizing a solid state system with no moving parts, no emissions, no toxic waste. You can't get more magical than that."

That sense of magic infuses all of Solman's sun-powered kinetic art.

Each sculpture and wall mural is sun synchronous. They move only when the sun shines using a photovoltaic motor system called Sol-Motion™. One single element piece in Solman's Wonderland involves an aesthetically rendered, circular sun/moon "face" slowly revolving atop a tall patinaed pyramid. Orange glass inserted between the round faces "beams" during the day. Another single element piece gently turns a green glass globe nested inside a gold metal spiral. The effect is cosmic and alchemical as if a wand-waving wizard in long robes should appear suddenly to explain the "magic".

Advanced pieces in Solman's gallery possess dual elements and more complicated motor and energy storage systems. The Sol-Dragon bird feeder, for instance, rotates a perch that provides birds a shimmering carousel ride. Birds adventurous enough to take the ride apparently start facing south, move to north then hop back to south again without ever completing the circle. This observed behavior contradicts some birders' opinion birds would never settle on a moving perch.

"I figured birds might like having fun, too," Bill claims. "Humans aren't the only species that likes to play. They seem to really enjoy it. Even when there's no food or water in the woks, they still come for the ride."

The consistent relocating from north to south seems to suggest the presence of an electromagnetic clock or some other internal programming necessary to read directions in order to migrate successfully. Below the double perch, two large woks—one for feed; the other water—also gently turn throughout the day. At night, the pyramid base illuminates dragon cutouts, Oriental symbols and white globes creating a Japanese lantern effect. Night power is supplied by a 12-volt battery fully charged during daylight hours by three-watt solar modules mounted in two sides of the base.

Although a single two-watt solar module provides enough energy to run the 1/800th of a horsepower motor Solman uses to drive his creations he often uses two or three modules for aesthetic reasons and to achieve maximum power. By turning each piece into the equivalent of a stationary tracking device, the sculpture receives the highest

possible exposure to the sun as it moves across the sky hitting each side of the base. The number of gear shafts depends on how many moving elements each piece contains. The four vertical Z-shafts of the hypnotically whimsical Orbitron begin in a flamingo-like symmetry that quickly decomposes into a perfectly engineered dance of intertwined mechanical pirouettes. It then recomposes with the four, multi-colored orb “heads” and shafts momentarily facing the opposite direction. Once again, the symmetry quickly decomposes into dance before recomposing in the opposite direction.

Filet of Sol is a three-element piece where wavy columns of delicate angel fish swim in an open-air aquarium. Only two parallel shafts of iridescent butterflies, however, hover in the air, while a single shaft turns an exuberantly large Sol-Flower of bright yellow, hand-hammered petals tilted on a giant green stem of recycled farm equipment.

“The angle of incidence in relation to the sun determines the degree of power,” Solman explains the science behind his initial approach to each piece’s design. “A perpendicular striking of solar radiation to cell surface is the most efficient. Therefore placement of each solar panel dictates all remaining elements of the sculpture or mural. Between summer when the sun is directly overhead and winter months when the sun moves lower in the sky, the angle changes significantly. In Arizona, an effective average rests between 22 degrees in summer and 42 degrees in winter. That’s why triangles and pyramids accommodate this design necessity best. Once panel placements are determined, I can then decide on motion, material, form, color.”

The finish Solman uses is anything from natural oxidation to the same powder coating used on cars and trucks. His preference, however, involves etching surfaces with acid. This opens metal pores to oxidation, creating an additional aesthetic feature to each piece. Applying the acid with brushes or simply allowing it to drip in different directions across the surface creates a highly appealing dark rusted effect. These added qualities highlight the subtle organic interplay between air and metal that also unifies each of Solman’s pieces. This etching effect can be halted at any time using a baking soda solution. When the desired effect is achieved, the entire sculpture is then sealed in lacquer.

Such an intense appreciation for organic elements first surfaced in Solman’s earliest artistic days as a wood sculptor. From 1975-1979, he worked in the famous, avant-garde furniture studio, Fabulous Furniture, ninety miles north of New York City. While there, he attended weekend workshops with three-dimensional sculptor, Igor Givatowski, and ultimately apprenticed under internationally renowned wood sculptor, Raoul Hague. Using everything from hand chisels to chainsaws, he eventually created one-of-a-kind pieces for such celebrities as Robert de Niro, Debra Harry and Henry Winkler using natural shapes and colors found in different types of exotic wood, most notably black walnut and ebony.

A move to Arizona in 1980 ignited Solman’s interest in solar energy. Working as a lab tech producing solar panels for Monegon, Inc. was his first step in a two-decade journey of giving both practical and aesthetic voices to the sun. Noting an excruciating slow rate of production in the lab, he quickly devised jigs that boosted manufacturing rates from ten solar panels a week to ten a day. Realizing an urgent need for engineering improvements in the emerging technology, he then embarked on a company-assisted, self-study course through local college and university courses studying both electrical engineering and photovoltaic systems. By 1984, he had won his first U.S. Department of

Energy National Innovation Award for designing a self-contained photovoltaic bus shelter lighting system for the City of Tucson, Arizona.

“It was cheaper than running electrical wire from a nearby pole to the shelter,” Solman explains. “The system involved a four-watt solar module charging a 12-volt battery to illuminate one 9-watt, compact fluorescent light, the equivalent of a 60-watt bulb. Total cost of the system was \$1500 per shelter. That amount was five times lower than running grid power to each site.”

The system worked perfectly with a projected life span of twenty years for the solar module and 3-5 years for each battery. Beyond changing light bulbs, the system required no other maintenance. The city was pleased enough with the design to first order fifteen units followed by an additional thirty-eight units from Solman’s first company, Electra Sun Systems. The shelters worked perfectly creating a safer environment for night bus riders and less liability for the city. Unfortunately, administration priorities and budgets changed. Maintenance ceased. Bus riders once again sit in the dark in Tucson at night.

In 1988, Mr. Cirrito won his second National Innovation Award for the integrated stand-alone photovoltaic power system and energy design of the Ross House built on the outskirts of Tucson. At the time, running power to the site would have been prohibitively costly. That made the relatively high price of \$32,000 to run a 3200-square-foot house totally on solar energy a bargain. Engaging in a joint venture with local contractor Tom Wuelporn, a rammed earth builder, Solman designed the power systems necessary to run the spacious house equipped with all modern appliances totally off-grid. In subsequent years, the Ross family added a swimming pool to the property. To cover extra load requirements, they decided to relinquish total independence and netmeter, tying back into the grid to meet higher needs on low solar producing days and getting credit when overproduction pours excess energy back to the grid. This common sense approach that effortlessly combines traditional power technology with renewable energy is already in place in Europe and Japan making conversion easier and more affordable. In most areas of the United States, however, despite laws mandating it, netmetering is severely hampered and delayed by power companies that create bureaucratic nightmares and added expense for homeowners trying to exercise their freedom of energy choice. It doesn’t need to be so hard.

Solman’s innovation award number three came in 1989 for SIPS, a solar-powered irrigation system. Photocomm, Inc., the company that bought Electra Sun Systems, turned this concept into one of their most successful products. This and other system successes made them an attractive purchase to Kyocera, the Japanese semi-conductor and energy giant. Even more than private homeowners, developers and cities are opting for solar irrigation, especially on planted medians where running traditional lines is too costly. Because electrical contractors and utility permits are not required, labor costs to use SIPS are substantially reduced. Landscaping contractors simply run the necessary irrigation lines. The power unit to operate them requires as little as two hours installation. Large new developments such as Rita Ranch and Rancho Vistoso outside Tucson use solar irrigation to create mature attractive landscaping along roadways before houses are built helping to create a more positive sales and marketing environment.

“One of the most overlooked areas in the energy resource debate is efficiency,” Solman explains. “Costs of energy can be massively reduced based on building and system designs alone.”

Proving his point, Solman designed power systems for the Marsland House, also in Tucson, and won the ASHRAE Energy Award in 1990 for outstanding achievement in design of energy efficient structures. Building this totally energy-independent home involved situating the house to receive maximum effect from south-facing solar panels and passive solar windows, installing energy efficient appliances, and opting for an evaporative cooling tower that cheaply and effectively distributes cool air throughout the house during hot summer months. Using air conditioning, an inefficient and high-load appliance, became totally unnecessary for the family’s comfort.

Solman’s enthusiasm and commitment to solar energy led to his appointment to the Solar Energy Commission of Arizona from 1987-1990. Responsible largely for dispensing information on the emerging technology, he helped produce videos, books, design manuals and brochures relating to solar systems, energy efficient houses, and annual events like the Pima County Solar Cook-out.

“Unfortunately about that same time, fossil fuel costs dropped so low people lost interest in the sun as being too expensive,” Mr. Cirrito states. “Combined with those market conditions, the Reagan administration also cut funding for solar and other renewable energy research by nearly 80% at the same time it eliminated tax credits and subsidies established during the Carter administration.”

Despite such frustrating setbacks in governmental support, Solman continued working in commercial design. Before switching to the fulltime pursuit of art, he designed a patented inverter used to convert single 110-current into the dual currents needed to run solar irrigation power systems. He also developed a patented “cooling device”—a whimsical novelty hat utilizing a mini-solar cell to run a miniature fan attached to the hat brim.

The whimsy apparent in the “cool” hat reasserted itself when Mr. Cirrito produced his first solar sculpture in 1997. His namesake Solman piece is an eight-foot tall prototype of stand-alone lighting that reveals his long-standing interest in utilizing the sun’s energy for practical use. A large white globe serves as a black metal stickman’s head while metal arms and Mickey Mouse hands hold a rectangular solar module overhead. Two metal feet attach in a ballet plié to a pyramid base that houses the 12-volt battery which stores energy when the sun shines then illuminates the globe head all night. In a Disney cartoon, the metal Solman would, at some point, straighten up, jump off his pedestal, and dart away into the night, carrying the module overhead. In real life, rural driveways, patios, campgrounds, rest stops on highways can shine all night courtesy of the sun and photovoltaics. Because there are no moving parts within the module itself or the battery charging system very little maintenance is required to make it a perfect, low-cost lighting option for isolated areas.

From his initial emphasis on practical application, Solman’s subsequent adventure into powering art with the sun has become more art for art’s sake. He is currently working on a co-commission with nationally known sculptor Susan Gamble of Santa Theresa Tile Works for the University of Arizona creating a forty-foot high tile and metal sculpture with solar-powered lighting. Up each tower leg Solman plans to install a solar panel that will power a LED light set behind attractive metal filigree followed by another

module then more lighted filigree. Although the combined filigree and tile composition will be visually attractive during daylight hours, the piece will truly come alive at night thanks to Solman's innovative LED design and use. Not only will the metal filigree sections glow they'll fire in a timed sequence up the tower all night long.

A second work-in-progress—The Four Elements of Sol—will use different colored glass in different geometric shapes to represent air, water, fire and earth. The basic elements of Nature according to alchemy set on four individual shafts will then dance integrated mechanical pirouettes beneath a triangular extension from the pyramid base that conjures images of the all-seeing Third Eye. Having a mystical “Third Eye” watch over the delightful dance below once again conjures images of a wand-waving wizard lingering around the corner to do more magic.

When asked to assess the future of practical applications of solar energy as well as his continuing artwork, Solman claims commercial solar power in this country is a mixed bag right now.

“Politics is the largest hindrance to renewable energy in the United States today. The current political climate is not helpful. Research and development funding has been cut at the same time fossil fuel and nuclear technologies are reaping increased federal subsidies. On the other hand, the demand for solar power is exploding. Companies in California are scrambling hard trying to buy enough panels to put systems together. They're completely overwhelmed.”

Beside Big Energy industries, car manufacturers also contribute significantly to the profound inertia against moving toward renewable energy in America. Europe and Japan are converting at accelerating rates. In order to facilitate the change and meet demand, they are buying American technology not American products. Our largest solar companies plus all their patents are now owned by Britain, Germany and Japan.

“People remain blissfully dependent on traditional energy sources until war erupts in the Middle East or a power crisis à la California occurs. Solar power is just one alternative readily available to free people entirely from Big Energy, both foreign and domestic. With a stand-alone UPS—an Uninterrupted Power System—you can leave politics and Big Government behind as well. In my book, that's a good deal,” Solman asserts. “That's a real kind of freedom I want my daughter to have when she grows up.”

Fortunately, future plans for his delightful and innovative artwork are not mired in politics. They sparkle in sunlight. Besides developing a walk-through gallery in his backyard that includes a solar-powered pond in one corner, he is planning a series of winged sculptures next.

“A flying heart is something I want to try. A three-dimensional heart with gently flapping wings. That would be fun.”

Oasis is the name of his most ambitious plan so far, although it's not fully developed yet. Solman says it will contain winged elements that gently fan onlookers as they approach the sculpture. As viewers move closer, an infrared sensor will start a pump that releases mist to cool their faces. On a hot summer's day, especially in Tucson's sweltering desert, such charming refreshment isn't easy to find. Neither is such original and joyful art. I bet it will make people smile.