The Future of Renewable Energy is Already Here

FROM WIND TREES TO SOLAR FLOWERS, INNOVATION CONTINUES TO SEEK WAYS TO HARNESS NATURE'S POWER

By Matt Chapuran

Awareness and investments in green technology are rising, but renewable energy is nothing new in the United States. According to Les Nelson, IAPMO's Vice President, Solar Heating and Cooling Programs, solar thermal power was the primary source of hot water as early as the late 19th century in states like California and Florida. At that time, solar thermal's primacy as an energy source was associated with hot water heating, and continued until the cost of natural gas and oil fell to the point where they could dominate the energy market.

Today, applications for renewable energy are rising in their diversity. But many unknowns exist for new products coming onto the

marketplace, including uncertainty of government subsidies and competitive pricing from non-renewable energy. Some of the most innovative applications and products are emerging from overseas.

Heating Your Pool with Solar Power

Solar thermal power has continued to show durability in the marketplace, particularly in its use for heating pools. Rather than using traditional electricity to keep a pool comfortably warm, which can cost thousands of dollars a year, solar heating can maintain a comfortable temperature at a much lower cost. "Solar heating is for comfort more than economics," Nelson explains. While inexpensive natural gas has eroded the demand for solar thermal's use in hot water heating, it may still be an attractive option for a larger multi-family mid-rise complex, at least as long as government incentives continue to be in place.

There are also industrial applications for solar thermal hot water heating. Process water heating is used in food processing, agriculture, or other industrial applications that require heated water. In some cases, solar thermal is used to augment non-renewable energy sources; solar raises the temperature several degrees, lowering the burden and cost of non-renewable power to bring the water to its optimal temperature.

Demand for pure solar power to generate electricity is a much more recent phenomena. "The only people that needed solar power," Nelson says, "were people who were building houses off the electric grid." For these consumers, solar power became more attractive, "once they found out that it would cost something like $100,000 to run five miles of electric line." Aside from satellite technology, there were virtually no residential or commercial applications for solar power until government subsidies lowered the consumers' installation costs.

Harnessing the Wind and Sun with Flowers and Trees

In 2013, France's New World Wind installed the first prototype of a Wind Tree. Unlike large industrial wind-power turbines, which require otherwise unused space and need to stand up to five stories tall, the Wind Trees are smaller structures that can occupy an urban plaza and according to New World Wind, require as little wind as five miles per hour to generate power. Their design emulates natural trees, integrating technology and nature into an urban environment.

If your existing building cannot accommodate solar panels or "wind leaves," but ownership still desires to have solar power harvested onsite, the smartflower is an innovative solution. The smartflower system resembles a large mechanical flower, but one that tracks the movement of the sun through the course of the day, maximizing its solar energy collection. During inclement weather, the system's "petals" retract and the entire system retreats into a protective shell. Once installed, its performance is largely self-sufficient.

Although domestically offered from a Boston-based company, the smartflower's origins are European, developed four years ago by an Austrian company. Madeline Scharff, Project Manager for SmartFlower Solar North America says that the smartflower holds up "very well in inclement weather. They're in place in the Swiss Alps and on a ranch in Texas," she says. The system automatically self-cleans, preventing build-ups of snow, dust, or dirt, in all but the most catastrophic conditions. The system can perform on a slope and with three or four hours, be moved from one site to another.

Forget the Panels, Make Your Entire Roof a Solar Collector

You may never feel the need to fire a bullet at your roof...while skydiving. And, to be fair,

Above: The Aeroleafs developed by New World Wind are synchronous generators with permanent magnets and axial flow. Designed in leaf form, their aerodynamic profile has been studied to be particularly sensitive to turbulent winds, especially in urban areas.

Opposite page: The Wind Tree is the first biomimetic wind turbine designed to exploit the smallest winds. It can be set up anywhere, as close to uses as possible, even in the heart of cities.

PHOTOS COURTESY OF NEW WORLD WIND

that is not exactly what Tesla is urging you too, but the famously innovative company does make clear on their website that their solar roofs are more durable than standard building materials, able to withstand hail stones traveling at 100 miles per hour.

When coupled with a Tesla Powerwall battery, Tesla's solar roofs promise to keep homeowners powered on, even during outages from the grid. Composed from tempered glass, these roofs are three times stronger than traditional roofing materials, strong enough that Tesla boasts an infinite warranty. (The batteries themselves carry a still-considerable 30-year warranty.) Tesla's website describes the warranty as, "the lifetime of your house, or infinity, whichever comes first. "

According to a statement from Tesla, "Tesla will manage your entire Solar Roof experience—from the removal of your existing roof through design, permitting, installation, operations and maintenance of your new Solar Roof. The installation should take roughly the same time to install as a tile roof installation, which is typically 5-7 days. Solar interconnection will vary by area due to inspections required by local jurisdictions."

Making the Numbers Work

While local and federal tax credits have contributed to the domestic rise of renewable energy, much uncertainty exists. Significantly, Tesla makes a point of emphasizing the solar investment tax credit as part of a potential consumers' financing package, and further suggests that the balance of the installation cost could be absorbed through mortgage refinancing, with a portion of that interest cost recoupable through a tax deduction. While Tesla promises that this credit will be in place through 2021, there are, of course, myriad factors affecting the long-term stability of a market sustained through government subsidies, including potential tax reform which could include altering the federal tax deduction for homeowners' mortgage interest.

When asked about the long-term trajectory of the solar thermal market, Nelson says that much depends on the costs of other energy sources, like the cost of coal. "Is fracking going to be a short-term or be with us for decades or centuries?" Nelson asks. "Solar thermal was competing with oil until the cost of oil dropped."

Economic bellwethers of green energy may reside overseas, particularly China, which has become the biggest producer and consumer of solar heated water. "There's no other way to get it than solar thermal," Nelson says of hot water in China.

Does Your Renewable Energy Have the Right Look?

Perhaps one commonly emerging feature of new green technologies is a desire to blend into existing environments: either natural or man-made. New Wind's Wind Trees are designed to imitate trees. According to an article by Melody Schreiber in Quartz, "CEO Olivier Calloud called the Piguet Galland tree 'as much a piece of art as an innovation in the domain of sustainable development.'"

Tesla's solar panels are designed to imitate the roofing materials of existing local architecture. According to a statement from Tesla, "The first tiles available will be grey smooth glass and black textured glass, with slate glass and Tuscan glass coming in 2018." The smartflower's design pays homage both to technology and to nature. When asked if this integration represented a trend, Scharff says, "It's no surprise that new companies and new technology emulate nature and try to fit in with nature and surroundings."

When it comes to cutting edge technology, it is important to discern the applicability from the design glitz. Nelson says that a potential buyer should ask, "How utilitarian is it? How much energy is it going to produce?" He advises always asking tough questions of renewable energy vendors, and to ensure that the application offers more efficiency than other solutions.