



# THE POWER OF 1,000 SUNS

BY SAMANTHA WRIGHT | PHOTOS BY WILLIAM WOODY

Although BrightLeaf Power is just five years old, the story behind the Montrose-based high-tech solar company dates back two decades, when Founder/President/CEO Doug Kiesewetter was looking for a way to power his ranch in Palestine, Texas.

“It was going to be horribly expensive and inconvenient to have electricity brought in,” Kiesewetter recalled. So he designed and installed his own custom flat panel photovoltaic system.

He hooked it up on a bluebird day – 102 degrees, and not a cloud in the sky – and couldn’t wait to start watching the meter spin. The results, however, were disappointing. Although the panels were rated for 200 watts, they were producing significantly less power than that.

He called the vendor to ask if he had done something wrong.

The vendor asked if Kiesewetter had read the fine print that said the hotter the temperature gets outside, the less efficient the PV solar panels become, losing 1 percent of output for every 2 degrees above 68 degrees Fahrenheit.

“Nobody had warned me of this outcome,” Kiesewetter said, and so “I start-

**MONTROSE-BASED BRIGHTLEAF POWER CREATES A RENEWABLE ENERGY SOURCE THAT'S GOOD FOR THE PLANET – AND FOR THE BOTTOM LINE**

ed casting an eye at traditional solar... to see if there was some way to make the technology more efficient.”

The more he looked into it, the more convinced Kiesewetter became that a fairly radical departure was needed from the traditional PV model, which under optimal conditions converts less than 20 percent of the energy in sunlight into electricity.

“I don’t know of any business that can do well wasting 80 percent of its primary resource,” Kiesewetter said.

In the problem, Kiesewetter saw an op-

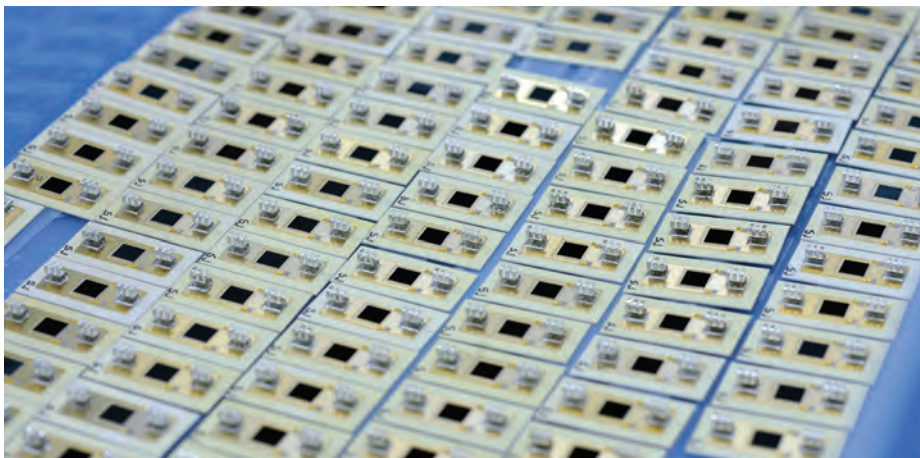
portunity that he couldn’t get out of his mind. Fifteen years later, that Aha! moment led to the birth of BrightLeaf Power.

## A MAN WITH A MISSION

Kiesewetter, driven by both an extraordinary entrepreneurial spirit and a deeply ingrained sense of philanthropy, has spent the past 35 years as a serial start-up entrepreneur – starting with a blank sheet of paper and a problem, and building multiple organizations to valuations in excess \$50-\$100 million, and then pumping the proceeds from the sale of those companies into philanthropic endeavors – mostly schools and hospitals – in the developing world.

At first glance, there is no common denominator among his wide variety of start-ups: a computer peripheral manufacturing company in the Silicon Valley; an optical memory company in British Columbia; an oil and gas project in the Gulf of Mexico; a currency trading company in Geneva, Switzerland; a medical malpractice insurance company in Bermuda ... and now, BrightLeaf Power in Montrose.

“It’s a goofy variety of stuff,” he ad-



mitted. “I like to take new ideas and put flesh on them.”

While each project has had its own unique set of hurdles, Keisewetter said, “Quite frankly the one we are doing now has been the most challenging of the whole group. It has been almost six years from start to first revenue. Generally we look for revenues within 12 to 18 months. It’s a huge challenge to keep the organization going this long based on ideas, not revenue.”

Now, BrightLeaf has arrived, with two installations up and running – a beta site at Cedaredge Elementary School and a brand new public/private collaborative project powering the City of Montrose’s water treatment plant – and more in the works, in Arizona and Hawaii.

Currently, BrightLeaf employs 70 people in Montrose, from blue-collar welders to high-end developers, some of whom have relocated from prestigious careers elsewhere in the high-tech and solar industries.

The company expects to employ as many as 300-400 workers here in the near future.

“We have survived all these hard years,” Kiesewetter said. “We have a product that is now shipping.” Despite the long gestation, Kiesewetter is convinced that the fundamental idea of BrightLeaf is profound.

“We needed to persevere, whatever the cost,” he said. “There has been a tremendous amount of pressure, but it has also been tremendously fun to get here.”

## HOW IT WORKS

The sun delivers its energy in two main forms: heat and light. Thus, there are two main types of solar power systems – solar thermal systems that trap heat to warm up water, and solar PV systems that convert photons from sunlight directly into volts of electricity.

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Opposite, BrightLeaf’s new installation at the Montrose wastewater treatment plant is now up and running. This page: Clean Room Assembly line workers inspect gallium arsenide multijunction cells for installation, and work on final assembly of the product.





BrightLeaf uses patented and patent-pending technology to blend the two systems, producing both electricity and heat from the same module. Through this cogeneration, BrightLeaf Power claims to deliver the highest solar power system efficiency in the world.

In the conference room at the company's modern, airy corporate headquarters near the Montrose airport, Sales Director Gary Bustin and Director of Corporate Communications Kern White explained how their system works.

Like many on BrightLeaf's leadership team, these two men have fascinating histories of their own. Bustin became interested in solar energy after running humanitarian projects off-grid in the jungles of Papua New Guinea; White comes from the private equity arena, with extensive experience in business and philanthropic efforts, nationally and internationally.

Both have been with BrightLeaf from the start. The young company went through several generations of research and development and \$17 million in private equity to get to where it is today. The original concept was to go with a product that generated only electricity, until the flat-panel market imploded, after a flood of Chinese imports.

BrightLeaf's product in development at the time was 30 percent efficient – double a typical flat panel's efficiency. But with the Chinese dilemma, they realized that was still not efficient enough.

"We hit the pause button and said, 'Let's drive efficiencies even greater,'" White recalled. The company shifted gears and began developing a unique highly concentrated photovoltaic thermal system (and currently has nine patents pending on the technology). "The basics are very standardized, but how we

are integrating them is highly sophisticated and patentable," White said.

Each manufactured unit consists of four arrays, each on its own pole, with a dual axis tracking system using unique software to maximize the arrays' exposure to heat and light, while they trace the sun's journey through the sky. Each array consists of four modules, and each module has a honeycomb of mirrors that gather the sunlight and direct it at tiny, über-efficient and heat-tolerant gallium arsenide multijunction cells able to concentrate the full spectrum of sunlight to 1,000 times its normal intensity.

As Bustin put it, "It's the power of 1,000 suns."

These high-tech cells are manufactured by Spectrolab, a Boeing subsidiary that provides spacecraft power systems for the International Space Station, the Mars rovers and a multitude of military





and commercial satellites.

To drive up even greater efficiencies, the BrightLeaf R&D team discovered how to capture the heat of the sun on the back side of the cells, thus getting electricity and hot water out of a single unit.

Here's how it works. The gallium arsenide cell absorbs the concentrated solar energy; as it gets hot, that heat is captured through a glycol solution that can heat water – ideal for any facility needing both electricity and hot water.

With this development, the unit's efficiency made a quantum leap to 70 or 75 percent, with 40 percent of the energy produced electrical, and 60 percent thermal.

"There is nobody else in the world able to capture solar efficiencies at that level," said White.

With its cutting-edge space-age technology, it makes sense that BrightLeaf's Montrose assembly plant is on Apollo Road.

Indeed, the same sort of urgent, brainy determination that infused the famous Apollo missions 50 years ago seems to drive the work that is happening at BrightLeaf today. As one of the company's engineers said at the recent ribbon-cutting ceremony for the solar array installation at the City of Montrose's wastewater treatment plant: "Failure is not an option."

The high-tech solar start-up came to Montrose after Kiesewetter fell in love with the community in the late 90s, and began looking for a way to bring good jobs here. "The fact that we live in a nice, high, sunny part of the world made it quite logical and feasible to do a start-up solar company in this location," he said. "I was thrilled to be able to locate BrightLeaf here; one of the main purposes in my life was to create major employment in this community."

Now, he can say, "Mission accomplished."

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Opposite: Officials from BrightLeaf Power, the City of Montrose, Montrose County, and Delta-Montrose Electric Association attended a ribbon-cutting ceremony at the launch of BrightLeaf's installation at Montrose's wastewater treatment plant last month. This page: BrightLeaf President/Founder/CEO Doug Kiesewetter in front of a laser punch press used to help manufacture structural elements of the solar units (top). BrightLeaf's "Twin Solar" technology utilizes copper pipes filled with glycol solution to gather heat and wires to gather electricity from sunlight (center). Product modules assembled for testing, in Bay 3 of the BrightLeaf manufacturing building on Apollo Road (bottom).



## IS BRIGHT LEAF POWER RIGHT FOR YOU?

- Remember, BrightLeaf's technology yields 40 percent electricity and 60 percent thermal energy. If you don't have enough demand for thermal energy, this system may not be a good fit.
- The system works better for new builds than retrofits.
- Currently, BrightLeaf does not offer units for traditional residential installation.
- Large grid-tied commercial and governmental institutions such as luxury hotels, ski resorts, university dormitories, hospitals and prisons are all a natural fit for the technology. So are "off-the-grid" estates.
- If you are currently on a natural gas system, you are paying about 7 cents per kWh, and under current market conditions, you will not see a return on your investment within the life span of the installation (although you will have the satisfaction of knowing you have weaned yourself off a fossil fuel-based, carbon-emitting energy source).
- If you currently pay in the range of 10.5 cents per kWh, (the average rate in Montrose and the surrounding area) you will see a healthy and fairly rapid return on investment. The higher the cost of the power you consume, the faster the payback will be. (In Hawaii, where consumers pay 38-42 cents per kWh, payback can happen within 2-3 years.)
- Each installation is market driven. Thus, BrightLeaf is not able to offer per-unit pricing. Contact the company for a consultation at [brightleafpower.com](http://brightleafpower.com).

## THE IDEAL CUSTOMER

BrightLeaf is discerning in selecting its customers. With a price point that's leftier than that of traditional photovoltaic technology, it is important to find clients with a significant requirement for thermal energy in addition to electricity.

"We match to the thermal side first, then the electric side," Bustin explained. "Our goal is to be an energy-solution provider; the solution is a big deal to us. There is no smoke and mirrors game. We are looking at how we tie our thermal into what they need. It's a custom fit."

Large grid-tied commercial and governmental institutions, from luxury hotels to ski resorts, university dormitories, hospitals and prisons, are a natural fit for the technology, as are "off-the-grid" ranches like Kiesewetter's own spread in Texas that got this ball rolling all those years ago.

Currently, the company does not offer units for traditional residential installation, although it intends to do so, "downstream."

"Our first entry is commercial," Bustin emphasized, with plans "to put them on homes across the board, but we are not there yet."

In areas where the cost of energy is extremely high, such as Hawaii, the system will pay for itself in energy savings within two to three years – a far cry from the 30-year payback of a typical flat PV panel setup. "It is a good fit for anyone on propane or fuel oils," Bustin said. "For us to offset fossil fuels is a no-brainer."

The two industries' price points could change, of course, as the cost of fossil-fuel energy continues to escalate.

Another application for BrightLeaf's technology is taking the thermal energy produced by the system, and turning it into cooling. It can even be used to distill water, which Kiesewetter is particularly excited about, because of its humanitarian possibilities in the developing world.

But that, too, is "downstream." Right now, the company is completely focused on the bottom line – both its own, and that of potential customers.

"The company's mantra," White said, is "if it doesn't make economic sense, we won't waste our time."

"In renewable energy, everyone can get so lost in being green and saving the planet, but you have to have an equally strong focus on business development."

Adding to its appeal is the BrightLeaf model's highly compact portability, with

a ground-mount that can be easily disassembled and taken to a new property.

The ultimate vision is to have something as rugged and easily assembled as an erector set, that can be taken to the developing world (or a military outpost), get set up, and be easily maintained.

## THE BIGGER WHY

The connecting thread in all this turns out to be Kiesewetter's dedication to philanthropy. He started his career as a charitable tax planner, and in the late 1970s created a public charitable foundation (he's still the chairman of its board). The foundation has given \$500 million to charity over the years, and currently has almost \$250 million in assets.

"One of the major drivers for me with BrightLeaf is the hope that in due season, we can provide power and clean water to the poorest of the poor," Kiesewetter said. "This is pretty central to who we are, and what we are trying to accomplish here. It's one reason I have been so dogged and persistent; I really do believe in the ultimate charitable benefit of doing this job and doing it right. You have to be willing to make some personal sacrifices to bring about consequences for the benefit of the world."

**'OUR GOAL IS TO BE AN ENERGY-SOLUTION PROVIDER; THE SOLUTION IS A BIG DEAL TO US.'**

— BRIGHTLEAF SALES DIRECTOR GARY BUSTIN

"Most of us in the company are driven by a sense that there is a bigger purpose to going to work each day," Kiesewetter said, "and if we do our job right we can make a positive impact on the world. You have to have a reason to get up in the morning and push yourself." 