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TAE Lands \$250M; Plots Irvine Expansion

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Norman: current iteration of TAE's reactor keeps plasma stable at 75 million degrees Celsius

TAE Technologies in Foothill Ranch is one step closer to making its ambitious dream of tapping into almost limitless supplies of energy come true, and is expanding its operations to Irvine to help move those plans forward.

TAE, which calls itself the world's largest private fusion energy company, this month announced that it had received an additional \$250 million in funding from a collection of deep-pocketed investors including **Google**, **Chevron** and **Sumitomo Corp. of Americas** to build its latest machine, a sixth-generation research reactor.

The machine, dubbed **Copernicus**, will be built in a new, 100,000-square-foot facility in Irvine.

TAE has now raised \$1.2 billion since its founding in 1998. It's one of Orange County's better-funded technology ventures.

The funding's ultimate goal: developing and commercializing a new source of clean energy that could fuel the Earth for the next 100,000 years.

While some may consider TAE's goals a moon-shot type of endeavor unlikely to see true near-term results, company officials say the future's near.

“Investors are warming up considerably to the promise of it and the likelihood that in the next few years—certainly within this decade—somebody is going to crack the nut,” TAE CEO **Michl Binderbauer** told the Business Journal.

Sun and Stars

From a scientific viewpoint, fusion is the same energy process that powers the sun and the stars.

TAE is one of dozens of scientific groups and companies across the world working on nuclear fusion a reality, which could dramatically slow the negative impacts from burning fossil fuels and help equalize global energy markets.

The company's maturity, funding, and investor support give it an edge in what is often called the search for the “holy grail” of energy production, according to Binderbauer.

Binderbauer holds a Ph.D. in physics from the **University of California, Irvine** and is a Business Journal 2021 **Excellence in Entrepreneurship** honoree.

“By the early 2030s, you will see the first commercial machine being deployed somewhere in the world,” says Binderbauer, who is aiming to make TAE the winner of the race.

TAE was valued at \$5 billion before the latest funding round. **Goldman Sachs** served as financial adviser for the transaction, the largest funding deal in OC for a private company this year.



Power Breakthrough

Along with the extra financing, TAE recently announced a new technology breakthrough.

TAE’s current, fifth-generation research reactor in Foothill Ranch, called **Norman**, has proven capable of sustaining stable plasma at more than 75 million degrees Celsius, 250% higher than its original goal.

Extreme heat is needed to make fusion a reality.

“TAE is committed to non-radioactive hydrogen-boron both for its abundance—in excess of 100,000 years supply globally—and because it is the cleanest, safest, most economical terrestrial fuel cycle for fusion, with no geopolitical concerns or proliferation risks,” the company said on July 19.

The company is now building out its new research reactor at an **LBA Realty**-owned Irvine facility at 9740 Irvine Blvd. The machine is named Copernicus after the renowned 16th century Polish astronomer.

The building is expected to be finished by next spring, with the Copernicus completion foreseen by 2024 and the first results from the super-high-tech machine targeted by mid-decade, Binderbauer said. He emphasized that supply chain issues may delay the company’s timeline.

Staffing at the Copernicus facility in Irvine will be “probably in the order of 200 people, maybe 200 plus,” Binderbauer said.

The property is near the intersection of Irvine Boulevard and Alton Parkway on the southern edge of the former **El Toro Marine** base, near a new **Amazon** distribution facility.

TAE will keep its existing Foothill Ranch operations, as well as employees overseas, according to Binderbauer.

As for the headquarters: “We may move it down to Irvine. We haven’t decided that yet.”

Smart Solutions

Nuclear fusion is not to be confused with nuclear fission, which splits a larger atom into two smaller atoms to release electricity, a process used at traditional nuclear power plants.

Fusion reverses that process, with energy produced when two atoms crash together to form one heavier atom.

Proponents note that nuclear fusion is inherently safe and a runaway reaction is impossible. “We can do this on a commercial scale without putting people in harm’s way,” Binderbauer said.

TAE is one of several companies looking to commercialize nuclear fusion; competitors include **Commonwealth Fusion** of Cambridge, Mass.; **Helion Energy** of Everett, Wash., and **General Fusion** of Burnaby, British Columbia.

“There are very few companies like TAE that have been around for two decades,” according to Binderbauer. “TAE is by far the most mature.”

The most common machine being built to achieve fusion is a tokamak, a donut-shaped device used to confine light elements in the form of plasma. That method is being developed at **ITER**, the international fusion project in France, for example.

“Fusion energy scientists believe that tokamaks are the leading plasma confinement concept for future fusion power plants,” according to the **U.S. Department of Energy**.

TAE, on the other hand, uses a relatively thin, linear machine.

Nat Fisch, a professor of astrophysical sciences at **Princeton University**, told CNBC television that the TAE process is more complicated for various reasons, including the larger quantities of energy needed to start the reaction.



“Taken together, this is a really, really hard problem—and it requires a very new learning curve. But the TAE team is really smart, and really fast moving, so if anyone is going to solve this problem, the TAE team is well positioned to be the one to do it,” Fisch told CNBC.

Da Vinci Code

After Copernicus, TAE’s next step will be a machine named **da Vinci**, after the Italian Renaissance artist and scientific pioneer.

“We think that’s achieved by around the end of the decade,” Binderbauer said, with commercial operations expected to start in the early 2030s.

Where that final research and development step takes place remains to be seen, Binderbauer says, pointing to complex regulations in California (see story, [this page](#)).

Though TAE’s fusion branch has yet to show revenue, the company expects to generate funds this year from ancillary businesses stemming from its fusion research.

Related businesses include technologies to fight certain types of cancer and other power management infrastructure.

California in the Running for 1st Fusion Power Reactor

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TAE Technologies hopes to debut its first nuclear fusion plant in its home state of California, though the less regulated Southeast U.S. has tempted CEO Michl Binderbauer to consider other locations.

The permitting process is much quicker in the Southeast, Binderbauer tells the Business Journal, while California has no shortage of regulations for grid uptake among other issues. In the Southeast, permitting can be done in weeks, he said “instead of five years.”

“If it were up to my heart, I hope it would be in California,” Binderbauer says. “I am always optimistic and hopeful about our common home in California.”

For now, he says, the site for its proposed da Vinci plant is an open question, while the company scouts opportunities across the country to “find the best fit.”

“By the early 2030s, you will see a first commercial machine being deployed somewhere in the world, preferably of course in California,” he says. “And then an industry gets born out of that.”

—Kevin Costelloe