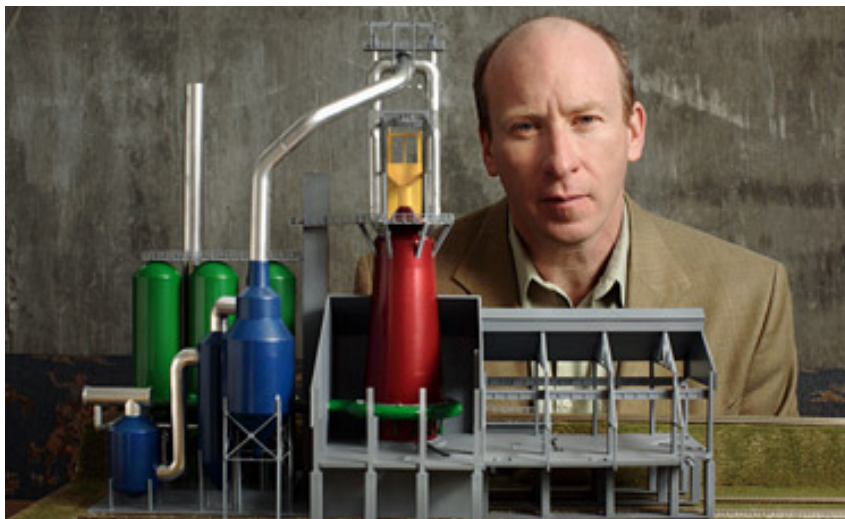


Man of Steel

by Andrea Chalupa | Mar 7 2008

Steel manufacturing is just plain dirty, no matter how you cut it. But California entrepreneur Mike Hart thinks he can make it clean and green—in China of all places.



Mike Hart behind a model of a blast furnace/gasifier developed by his company.

Photograph by: Timothy Archibald

A sign on the door of Mike Hart's office in Davis, California, reads "6 percent of the world's energy will come from this basement."

It's a bold statement from a bold guy, and it refers to Hart's hope that his Sierra Energy Corp.'s system of turning landfill waste into clean-burning synthetic gas can one day provide a sizable percentage of the world's energy. Considering that his startup has yet to get any of its alternative energy technologies into mass production, it's an audacious, almost ridiculous, prediction. But Hart insists the goal is feasible. "The technology is dead simple," he says. "It's just a matter of access to capital."

To get that capital, Hart, who also runs Sierra Railroad, one of California's oldest train lines, is focusing first on developing a cleaner way to make steel and, in the process, is helping address China's environmental crisis. China has the largest steel industry in the world, contributing to acid rain and other health threats across the country and producing roughly 2 percent of the world's greenhouse gases.

Sierra Energy created a process called Fastox, which requires 50 percent less coke—a substance derived from the extremely dirty process of burning coal—while potentially increasing efficiency by as much as 40 percent.

In addition, the clean-burning synthetic gas created in the process can be used as a source of clean energy for power plants, thus replacing the need for coal. “The added advantage is that the gas created will be directly useful to making power,” says Hart, who helped introduce non-petroleum-based biodiesel to the railroad industry in 2001. “The net effect is an enormous reduction in emissions.” The only problem is that Fastox has yet to be tested in an industrial environment.

In the past few years, Hart has tried unsuccessfully to persuade U.S. steelmakers to help him develop the first working prototype. All he needs is a single steel blast furnace and a \$5 million investment, but Hart says U.S. firms are reluctant to be the first ones to try it out.

“Americans have become totally risk-averse,” Hart says. “They all asked, ‘Where else is it being done?’ ”

Hart began thinking of trying to develop Fastox overseas and naturally looked to China, where the steelmaking industry has increasingly been migrating in the wake of environmental reforms and related lawsuits in the U.S. and Europe. Last year, a friend put Hart in touch with Margaret Wong, president of the McWong Environmental Energy Group, which connects California-based tech companies with companies in China. She, in turn, introduced Hart to representatives from three of China’s largest steel manufacturers—BaoSteel, Bayisteel (a subsidiary of BaoSteel), and Jian Steel.

For two weeks in January, Hart traveled from Shanghai to Urumqi, in far northwest China, wining and dining executives from the three companies (“My liver is slowly recovering,” says Hart). All three readily agreed to join in the development and testing of a Fastox prototype. With roughly 1,000 blast furnaces in China, Sierra Energy has a potential market of \$1 billion if it can get all of the country’s steel companies on board—that is, if the prototype works.

The Chinese steel industry is willing to take the risk to help develop and test Fastox because of its urgent need to **rein in pollution**. Because of China’s heavy reliance on coal, over one-third of the country is exposed to acid rain. Massive coal use has also led to respiratory problems, polluted waterways, and smoggy skies over China’s major coastal cities. Beijing’s latest five-year plan calls for the country to reduce energy use by 20 percent by 2010, in part to combat pollution, but so far the country is falling woefully short of that goal.

“If we could do the tests of Fastox tomorrow, they would,” says Hart of his partners. “They want this to be done as quickly as possible. The Olympics are coming up.”

Indeed, as the summer Olympics approaches, the Chinese government is cracking down on polluting industries by closing the worst-offending plants. “China cannot afford to become dirtier in 30 years,” says Hongyan He Oliver, a research fellow in energy policy at Harvard’s Kennedy School of Government. “It’s already hit the bottom.”

Hart’s next step is to put together a budget outlining exactly how much the development of the Fastox prototype will cost and to work

out which of the three steel companies will be the first to host it. Hart expects the financial and engineering details to be figured out by the end of March and construction of a prototype to begin soon thereafter.

Hart is not the only one hoping to profit from helping China's steel industry become greener. In November, Siemens finished outfitting a BaoSteel plant outside Shanghai that employs a new steelmaking method: It doesn't use coke at all and reduces emissions up to 90 percent. The problem with this approach, though, is that each plant must be rebuilt from scratch at a cost of hundreds of millions of dollars. Siemens recently won a contract to construct another such plant for BaoSteel by 2010.

Fastox has the advantage of only requiring a much cheaper modification to existing plants, though the potential benefits are also less substantial. "Sierra Energy has that advantage, but it's kind of halfway there," says George Haley, director of the Center for International Industry Competitiveness and a professor at the University of New Haven School of Business. Fastox "continues to require coke, and Chinese coke is of very poor quality." This means that the process is still likely to lead to significant emissions, according to Haley.

Hart counters that reducing the use of coke through Fastox will still be meaningful and result in lower emissions. He's convinced that Fastox offers the most viable option for Chinese steelmakers and believes that China's current environmental crisis will be met head-on with the same fierce pragmatism that has been thrusting the country into modernity.

"Energy efficiency and environmental practices are the same thing," Hart says. "The Chinese recognize that and they're putting a huge amount of effort into achieving it as a goal."