



Emerging Technology

## Transforming Coal Into Clean Energy

Josh Wolfe, Forbes/Wolfe Emerging Tech Report 10.12.09, 5:15 PM ET

Tim Vail is the president, chief executive officer and a director of Accelergy, a multinational integrated coal-to-liquids (CTL) technology company with operations in China and the U.S. [Full disclosure: my venture firm Lux Capital is an equity investor]. The company has developed proprietary technology that cleanly produces a wide range of advanced transportation fuels directly from the world's abundant coal resources without the harmful emissions normally associated with coal.

Before joining Accelergy, Vail was the president and chief executive of Synthesis Energy Systems, a global developer of coal gasification facilities that cleanly produced high-quality transportation fuels from low-rank coal resources. During his tenure at SES, Vail raised more than \$200 million for the business and successfully listed the company on the Nasdaq stock exchange.

Prior to joining SES in 2005, Vail's entrepreneurial career spanned nearly two decades in the alternative-energy business working with technologies from fuel cells to clean coal. These efforts included serving as a director of commercialization for fuel cell development for General Motors, where he closed the world's largest fuel cell commercialization deal with Dow Chemical and developed a fleet of fuel cell vehicles for the U.S. Postal Service.

Prior to his position at GM, Tim was the vice president of product development for the New Power Co., a start-up subsidiary of Enron. From 1995 until starting work for the New Power Co., Vail was a vice president at Enron Energy Services, focusing on alternative energy opportunities. He was also a securities lawyer with Andrews & Kurth, LLP from 1990 to 1993. Tim holds a J.D. from the University of Houston Law Center and a B.A. in economics from the University of Texas at Austin.

### **Josh Wolfe: Can you describe the path that led you to join Accelergy?**

**Tim Vail:** I've been in the alternative-energy business since the mid-1990s. I am actually a securities lawyer by training and was doing securities work for primarily energy companies in the early '90s. I was intrigued by the growth potential of the alternative energy space and ended up forming a small energy venture with a client in 1993. We sold the company to Enron in 1994, and then I worked at Enron as a specialist in alternative energies until the company's demise in 2001.

We looked at everything from advanced metering and communications to remote building management before anybody else was talking about it.

### **Where did you go after the collapse of Enron?**

I was one of the early founders of a company called New Power, which was a spin-off from Enron. It was for residential and small commercial customers. We raised more than \$750 million in three rounds of investment, and grew to become the largest provider of non-utility residential electricity. Unfortunately, Enron was our major counterpart, so with Enron failing, the business couldn't stand on its own. That's when I received a call from the head of General Motors' fuel cell group.

GM had the world's largest fuel cell program (and still probably does today). They hired me to be the director of commercialization in 2002, and it was a tremendous job. We saw all kinds of firsts: the first fuel cell vehicles, the first fuel cells in China and many others. I left in 2005 to join Synthesis Energy Systems. SES was really focused on taking low-value coal resources and turning them into high-value liquid products.

**After more than 15 years working within many different facets of the alternative-energy business, what excites you about Accelergy?**

Accelergy has the ability to create advanced fuels from unconventional resources through a very powerful technology called direct liquefaction. The technology was developed over the course of 12 years by one of the world's largest energy companies (our partner to be disclosed in the near future), and it has the ability to convert carbonous resources (such as coal or other feedstocks) into a distillate stream that can be turned into a wide range of high-quality liquid fuel products. This includes everything from jet fuel down to high-octane gasoline.

**What's important about producing high-quality fuels from "unconventional" resources?**

One of the dreams of alternative energy is to be able to reduce our dependence on imported oil, and this technology allows us to use domestic resources for our fuels. So, from an energy security perspective, it's important. But what's also important is that from our perspective, this is an economic play as well. We can actually produce these fuels at a lower cost than what's currently available in the marketplace. We've seen some pretty wild price swings on oil, from a peak of \$140 a barrel all the way down to \$32 or something crazy like that, but I think we're going to see more sustainable prices going forward in the \$90-range as opposed to prices down in the \$40s.

If you can sustain oil prices at \$70 a barrel or above, it opens up the door not only to our technology, but to a whole host of alternative energy technologies that are out there. And I think it's incumbent upon us here in the U.S. to find ways to use our indigenous resources, and use them economically. China is attempting to do the same thing with its coal reserves. The beauty of our direct liquefaction technology is that it is very efficient in the conversion of our resource to an end product.

**Just how efficient is this new process as compared to existing methods?**

You may have read a bit about Fischer Tropsch type processes. These represent the majority of the current coal-to-liquids and biomass-to-liquids technologies, and they produce, on average, two barrels of product for every ton of introduced material. Our technology has the ability to increase that figure by 50%, so for every ton of input, we can produce three barrels or more of product on the back end.

Some of the challenges with traditional coal-to-liquids technologies are that even with oil at \$70 or \$80 a barrel, the economic benefits are fairly marginal. But with our technology, adding that extra 50% vastly improves our economics, which makes it a very compelling story with \$70 per barrel oil.

**How much did it cost to develop this technology?**

One of the world's largest energy companies spent over \$1.5 billion and more than a decade developing this technology. This wasn't just on paper, either--they built a demonstration-scale refinery taking standard bituminous coal and converting it into high-quality jet fuel. Accelergy has been able to not only license this technology, but also transfer all of the expertise they acquired in developing the process and building that facility.

### **What do you mean when you refer to "advanced" fuels?**

I'll give you an example. For the jet fuel we can produce, the actual chemical nature of the fuel is far superior to traditionally derived petroleum-based fuel (hence interest from the Air Force). We can produce a product that has a much wider band of temperature stability, enabling the new breed of stealth fighters that are flying faster and higher than traditional airplanes have ever flown.

The need for a thermally stable fuel has become paramount, and that is just the type of fuel that we produce. Another interesting fact is that we actually achieve a higher energy density per gallon of fuel, so planes will fly farther for the same weight of fuel on board. Being able to have a higher density fuel to extend the range of their aircraft is a real benefit for the Air Force. So, going forwards, I think you'll find that synthetically derived jet fuel that allows planes to fly higher, faster and farther is going to carry a hefty premium.

### **Can you comment on greenhouse gas emissions?**

No matter what feedstock you're using, you need to have a plan to manage greenhouse gases when you begin any sort of project like this. One of the great attributes of our technology is that our direct conversion process produces one-third of the carbon dioxide of competing, indirect coal-to-liquid processes. So, right off the bat, we have a 70% advantage in the output of greenhouse gases and that goes back to that same efficiency I spoke to earlier.

That alone is extremely helpful, but it's not enough. The technology also has the capability to utilize biomass in the process. With the introduction of biomass into the direct liquefaction technology, we achieve what we call an integrated coal-to-liquid process (ICTL). With the integration of the biomass, you can actually create an end product, be it jet fuel or gasoline, which is on par with traditional refining from a carbon dioxide standpoint.

That's the holy grail of this business--to take unconventional resources such as coal or biomass, and convert them into useful fuel that requires no vehicle or aircraft conversion and no compromises in regards to greenhouse gas emissions. We are on path to do that today.

### **What do you see as some of the biggest risks facing the business?**

It comes down to capital risk and technology risk, and these are the things that hinder all small companies with a big technology. From the technology perspective, we have a great deal of data and we have a small army of scientists who have been working on this technology for years, so we feel we have a great head start and vastly diminished risk. However, we've still got to move forward and build the next steps of this technology, which includes a demonstration unit that can accept biofuels and is better and cleaner than the previously built model.

In regards to capital, we need to ensure we can continue to raise the funds necessary to move this technology forward. So while we face both financial and technical risks, we feel confident that we can manage them.

### **What are some of the next steps in the company's development?**

Over the next several months, we're going to produce a comprehensive study, backed by a government lab, on the comparison between indirect and direct coal-to-liquids technologies. It is going to be very important to demonstrate the efficiency and emissions advantage that we have over traditional technology.

The next thing is to actually build our demonstration unit, which we'll hopefully have up and running within the next 12-14 months. We'll be taking a blended feedstock of coal and biomass and turning it into jet fuel, which is a big proof of concept for our technology. Concurrent with the development of that project, we're going to be out looking for a partner to help us build a commercial project.

**What do you hope to bring to the company based on your past experience?**

The "been there, done that" mentality is a big advantage. This is something I've done with a number of different technologies in a number of different areas. I'm very bullish that we have a unique capability here with the direct liquefaction technology, it just needs to go through the commercialization steps, and there's no way around that. But having done it before, and being able to take a technology from the lab to actual early commercial use, is what the Accelergy team is good at. We've also demonstrated the ability to raise money for these types of efforts. Both David Eichinger (Accelergy's CFO) and myself have been successful in raising hundreds of millions of dollars in both private and public rounds for these types of technologies.

**Has the new administration been supportive of your efforts?**

It's been a mixed bag. Within the alternative energy realm, the administration seems to have its pet projects, and if you're not on that list of pet projects, you don't receive the amount of focus that you'd like. That being said, Accelergy recently received a nice grant from the Department of Energy for some of its research in CO2 mitigation. Hopefully we will be a beneficiary of more funds in the future. In general, I'd like to see the administration take a more active role in alternative energy, broadly defined.

**If Accelergy is successful in demonstrating its technology at a commercially relevant scale, do you see the company as an actual producer of fuels or a provider of new technologies to the industry?**

Definitely a provider of new technologies. We are not a project developer; projects of this scale require billions of dollars and long lead times. Our goal is to get these technologies ready for the market, and work with the large-scale companies that can actually build these plants. If you look at the past missteps alternative energy companies have made, it's that they've gone out and tried to be everything to everybody, which means building these large plants, and that's just extremely difficult to do. We're going to focus on licensing technology.

**Where do you envision Accelergy in five years?**

It'll be either a publicly traded company with a suite of advanced fuel technologies, licensing these technologies to some of the biggest companies in the world, or we'll be a subsidiary of one of those companies. It could go either way.

**Excerpted from the September issue of the Forbes/Wolfe Emerging Tech Report.**