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## FEATURE: Q&A: Synterra Energy's CEO, Chairman on Commercial Scale-up, Industry Ongoings

In late July, California-based Synterra Energy announced the completion of a [merger between Pacific Renewable Fuels and Chemicals, and Red Lion Bio-Energy](#). Synterra, which was [founded in December 2009 as a joint venture](#) between Pacific Renewable and Red Lion, was also awarded a US\$25 million U.S. Department of Energy (DOE) grant that began in 2010 to demonstrate the commercial readiness of its integrated biorefinery technologies.

*Ethanol & Biofuels News* recently spoke with Synterra Chairman Alex Johnson and CEO Robert Schuetzle to learn more about the company's activities, industry trends and what's ahead.



Synterra Energy's pre-commercial integrated biorefinery, funded through a US\$25-million Department of Energy contract, located in Toledo, Ohio. Photo courtesy of Synterra Energy

**EBN:** Could you first tell us a little bit about Synterra and some of your company's activities?

**Schuetzle:** Synterra is the merger of two cleantech companies. ... Our teams have been working together for about four years now on a next-generation thermochemical platform for the efficient conversion of a variety of waste biomass types into a renewable synthetic diesel fuel.

This platform goes back to really when our two legacy companies were founded in 2006 to address some of the technical challenges of economically converting biomass to drop in diesel fuels. Our technical teams identified some key challenges that weren't being addressed in the market, and those are our patent-pending and patented Syntrex technologies that are on the market today.

**EBN:** Could you elaborate on how Synterra's process was developed and how it works?

**Schuetzle:** As opposed to oil, gas and coal, which are resources that have very large volumes available in one geographical location, biomass and other waste products and alternative resources are typically a distributed resource. So in order to achieve the best economics, your processing plant has to be at a smaller scale than say a refinery scale, and therefore it has to be easier to use, the number of unit operations has to be a lot less to keep capital costs and operating costs down, and each unit operation has to be more efficient and drive better conversion.

### In This Week's Edition of Ethanol & Biofuels News

#### PRICES & MARKETS

Market Report  
Futures  
Inventories & Production  
Prices

#### LEGISLATION & POLITICS

USDA Announces Funds for 900+ Projects to Boost Renewable-Energy Output  
Vilsack Tours Bio-Manufacturing Facility, Highlights Biobased Product Potential  
CARB Low-Carbon Fuel Standard Discussions Resume August 25-26  
EPA Now Accepting Stationary-Source GHG Reporting Data

#### TECHNOLOGY UPDATES

Study Finds Alligator Fat Promising Biodiesel Feedstock  
USDA ARS Researchers Develop Grading System for Bioenergy Grasses  
HDS International Acquires License for Carbon-Capture, Algae-to-Biofuel Technologies

#### INDUSTRY & FACILITY NEWS

INEOS Receives US\$75-Million USDA Loan Guarantee  
DOE Offers Abengoa Conditional Commitment for US\$133.9-Million Loan Guarantee  
EPA Fines NEDAK Ethanol US\$3,600  
POET, Earth Partners Team Up to Develop Conservation Biomass in Midwest

GTL Resources Achieves Safety Milestone at Illinois Biorefinery

EIA: 3.9% Increase in U.S. Energy-Related CO<sub>2</sub> Emissions in 2010

• [Additional Stories Online](#)

#### INTERNATIONAL DEVELOPMENTS

Petrobras, Sao Martinho to Invest in US\$520.7-Million Ethanol Expansion  
U.S., Brazil Launch Strategic Energy Dialogue  
Western Biodiesel Fined for Methanol Release  
Novamont, Genomatica Create JV for First Industrial Butanediol Plant  
Mission Signs Contract with Global Oil Major

So going back to 2006 when we started our technology development, those are the goals that we outlined for the platform. We've designed a completely different thermochemical platform for waste biomass-to-diesel fuel, and it works in a two-stage process. The first stage is the conversion of waste biomass into a synthesis gas, which is hydrogen and carbon monoxide. Now synthesis gas we believe is the ideal intermediary for fuel production because it's the building block for a variety of hydrocarbon fuels and chemicals because it's made up of hydrogen and carbon monoxide [CO].

Our biomass-to-syngas side of things is a very unique process, it's not gasification – it uses a slow pyrolysis followed by a steam reforming step to get ultra-clean synthesis gas with the right hydrogen to CO ratio. So is very important because that simplifies traditional processes and allows us to produce that synthesis gas a lot more economically than the technologies that have been developed in the past. So that's the first side of the process.

Now the second side of the process is synthesis gas into diesel fuel. Traditionally, Fisher Tropsch-type technologies have been used to do this and the way those technologies work is they take that synthesis gas and they convert it into a wax product that then has to be refined into diesel fuel, jet fuel, naphtha and other products. So that works at a very large-scale. For example, Shell has built a very large gas-to-liquids plant recently [in Qatar] at about a \$12 billion price tag, but when you're talking about conversion of alternative resources like biomass, again you have to function at a smaller distributed scale, so adding that refinery on the back end of the plant doesn't work. So what we've done is we've taken the synthesis gas and directly converted it with high selectivity into a synthetic diesel fuel without having to go to that refining process. So we call it are one-step catalytic conversion process and again that simplifies this plant design that we've developed.

The synthetic diesel fuel that we produce is a drop-in replacement for traditional petroleum-derived diesel fuel, and it has a few premium qualities that our refiner and blender partners are interested in. Number one, it has a cetane value that is about 50% higher than traditional diesel fuel. It has a cetane of over 70, which is extremely high. So for a refiner or blender that has problems meeting cetane specifications, using this as a blend stock is very attractive. The second quality is it has no sulfur, so again with a lot of refiners having challenges meeting their sulfur specifications, this fuel is very attractive. So there are some premium qualities there, and in addition, the fuel is a renewable fuel that achieves an 89% greenhouse gas reduction when you compare it to petroleum-derived diesel fuel.

Johnson: So that puts us in the space of the cellulosic bio-fuel category based on RFS2.

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**EBN:** *You mentioned your plant design – could you tell us about your current projects?*

**Schuetzle:** The project we are working on right now is our scale up of existing technologies. In 2006, 2007, we did research and development. We then went on in 2007, 2008, to pilot-scale facilities and beyond that larger pilot-scale facilities. So the plant that's under construction right now is what we call a pre-commercial demonstration, this is being funded under a \$25 million [DOE] contract that was awarded and began last year. So the plant, the integrated biorefinery in Toledo, Ohio, will process 25 dry tons of waste biomass. So that's our final scale up before a number of commercial projects that are in the planning stages.

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**EBN:** *Your company uses the term “integrated biorefinery” – how exactly would you define that?*

**Schuetzle:** It's a technology that's fully integrated, biomass comes in the front end or diesel fuel products come out the back. So one of the reasons that we did the merger of our two legacy companies is to provide our customers and licensees and project partners a one-stop shop for an integrated platform. A lot of the other technology providers in the space might provide a component of the technology that then has to be integrated under an engineering contract and that adds technical risk. So what Synterra provides is a full package for the entire plant that's been demonstrated as an integrated platform.

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**EBN:** *What are some of the challenges that you're seeing in getting a commercial-scale facility up? Is your plant almost finished?*

**Schuetzle:** This is a scale up of existing technologies. With the plant in Toledo, construction will be complete, and we'll start operations in 2012, so that project is almost complete.

Certainly our project economics are pegged to the price of oil so higher oil prices for us make our pro forma look a lot more attractive and where things are today, frankly are a very good place for us – so projections on higher oil price trends help with commercial finance. In some areas, securing long-term biomass feedstock contracts do take some time, certainly need to have long-term arrangements with feedstock providers in order to ensure that there is going to be a steady stream of feedstock over the plant's lifetime to operate these facilities. So I'd raise those two as the two biggest things that affect our commercial economics and things we track very closely.

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**EBN:** *Are you seeing funding starting to come back?*

**Schuetzle:** We believe that the selection under the DOE project provides some additional validation of the success of the technology, and we continue to meet technical goals and benchmarks, so I believe that's helped in telling our story, absolutely.

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**EBN:** *Are there similarities between biorefineries to traditional refineries upon which the industry could play off?*

Johnson: That is part of the RFS2 fuel standards and the mandate that is out there by the government, that the partnership between any integrated biorefinery and Big Oil, however you want to say it, is a critical path to be able to get into the market. We're going to have to work together. So the closer you are to a blending source, the better.

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**EBN:** *Are there any sort of strategies you've seen that would facilitate that kind of partnership?*

**Schuetzle:** We have been in discussions with some potential partners that are Big Oil players that own refineries, and this co-location concept or locating near a refinery is attractive to them for the reasons that Alex mentioned.

So they obviously have a good grip on the fuel distribution and getting this to market and can control that supply chain, so providing them a product that's attractive not only from the renewable side of things to help with RFS2 and other requirements like California's Low Carbon Fuel Standard, LCFS, that went into effect earlier this year, that's a benefit to them. But in addition, this fuel is a premium product, and, as I mentioned, could help with cetane and other qualities, so using that as a bland stock for them is something that seems very attractive.

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**EBN:** *Would this fuel be blended with petroleum-derived fuels or would it be used alone?*

**Schuetzle:** Well it could be used neat, as a 100% diesel fuel product or it could be blended with their petroleum product at a certain percentage to help with cetane, help with sulfur requirements and then help to meet those renewable standards requirements.

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**EBN:** *So Synterra is only producing its renewable diesel – no co-products?*

**Schuetzle:** We do have a renewable chemicals platform that we are pursuing, and probably not as much of interest to the refiners as to some of our potential chemical partners, but we are initially pursuing chemicals that are surfactant intermediaries, surfactants are used in shampoos and other

detergents. Some of the consumer products and chemicals companies that play in this market, that's an attractive for renewable alternative for them.

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**EBN:** There have been some discussions that in order for the biofuels industry to really be financially viable, companies need to ensure that they have a wide-ranging product portfolio beyond just biofuels – do you agree?

**Schuetzle:** We do believe our base diesel platform is competitive in the marketplace today. Now in some markets, certainly going after the chemicals product provides superior economics, but keep in mind that the diesel fuel market is so large that we or others can't affect that in the short term, so there is a lot of price certainty there.

Some of these specialty chemical markets you're subject to supply peaks and valleys that could affect long-term pricing. So while you might be able to take advantage of a spot price of this year, is that price going to remain stable for the next 20 years? And that's a lot more of a question in a specialty chemicals market than it is in a transportation fuels market. So we think price stability in fuels because of the inability of new supplies to affect that is one of the key benefits of going after the diesel fuel market.

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**EBN:** *So how commercially viable is the biorefining industry right now?*

**Schuetzle:** Well clearly they are a number of players at the tipping point of commercialization, ourselves included. We believe based on our technological platform that the future is only up from here for next-generation fuels. But I would say that that's predicated on oil prices, and that's a product we're competing with.

Johnson: If you look at, we were at the biomass conference hosted by the [DOE in late July] in Washington, you know they're going to issue [a report in the near future that says there is a billion tons of biomass](#) that can be annually produced that can be converted into alternative products and that starts to get into the realm of making a real impact on our fuel supplies not being beholden to OPEC [Organization of the Petroleum Exporting Countries] and other countries.

A billion tons getting converted into fuel is a significant impact. ... It will take some time but we are certainly moving in the right direction.

**EBN:** *So you don't see any problems with feedstocks in the short-term then?*

**Schuetzle:** Well as Alex mentioned, there is plenty of waste cellulosic feedstock for us to procure, and we do think that as the technologies come online to process these wastes that biomass markets will begin to develop and you'll start

August 25, 2011

seeing growth of energy crops and other cellulosic products that will help keep the economics in line.

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**EBN:** *When you expect to see this industry really start to make a real impact?*

Johnson: I think all the technologies are starting to sort themselves out as to what they can do and there are more companies out there at this point that are starting to get a better feel on how many gallons per dry ton of biomass that they're going to be able to make, and then in what time frame and in what quantities. So my guess is that right now we're looking at 2015 before you really start seeing significant inroads in making product at that point, and that would just be the start.

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**EBN:** *So what does this industry need to move forward?*

Johnson: Financing of projects would probably be the biggest thing that I would say right now, that trying to take this, to get this to the next level with the economy that we have been living in for so long, for the last three years, has made it very difficult to get this to the next level.

**Schuetzle:** I would agree, and as oil prices stay inflated, that continues to trend higher, that makes the financing easier as long-term projections are forecasted upwards. We certainly aren't in the business of doing oil price forecasts, but I did read a *Barron's* article about a month ago that forecasts are \$150 a barrel oil next year, so if that does come to bear that makes our pro formas look even more attractive than they are today and helps close those financing rounds.

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**EBN:** *What are Synterra's plans moving forward?*

**Schuetzle:** We have a number of commercial projects in the planning pipeline, some clustered in the Midwest and several in the Western United States. We are talking with qualified licensees that would leverage our technology to deploy the Syntrex platform into the marketplace that would allow us to scale a lot faster by having qualified development partners deploying this technology in addition to Synterra-owned plants, so it's really a two-pronged strategy.

– Louise Poirier