Fuels Industry Newsletter

February 2013

"Linde licenses gasification technology to Finish company"

By Erin Voegele, *Biomass Magazine*, January 28, 2013

Germany-based Linde Engineering Dresden GmbH has signed an agreement to license its Carbo-V biomass gasification technology to Forest BtL Oy, a Finish biofuel developer. According to information released by Linde, the Carbo-V technology will be implemented at a new biomass-to-liquid facility in Kemi, Finland.

The transaction represents the first licensing agreement for the technology, which Linde acquired from Choren Industries GmbH in Feb. 2012. The process is a multi-stage biomass gasification process. Information published by Linde notes that during the first phase, a low-temperature gasifier converts biomass into biocoke and carbonization gas. The second stage involves partial oxidation of the gas in a high-temperature gasifier. During the next stage, biocoke is blown into the hot gas stream of the high-temperature gasifier. The synthesis gas is then preconditioned before being processed into biobased liquid fuels.
Read more here: http://www.biomassmagazine.com/articles/8565/linde-licenses-gasification-technology-to-finish-company

"Carbon Sciences Enters Into Technical Services Agreement With Fluor"

The Wall Street Journal, Market Watch (press release), January 29, 2013

SANTA BARBARA, CA, Jan 29, 2013 (MARKETWIRE via COMTEX) -- Carbon Sciences Inc., provider of a complete solution for transforming abundant and affordable natural gas into clean burning gasoline and other transportation fuels, today announced that it has entered into a technical services agreement with Fluor Enterprises, Inc., a division of Fluor Corporation ("Fluor"). Under the terms of the agreement, Fluor will perform consulting engineering services for the development of Carbon Sciences' proposed miniGTL ("gas-to-liquids") plant.

"We are pleased to announce that Fluor will act as a consultant to our company," said Byron Elton, CEO of Carbon Sciences. "Fluor is one on the world's leading engineering services firms and has a very strong presence in the energy industry. Their extensive experience in natural gas to liquids facilities will be especially helpful in the development of our miniGTL project."

Carbon Sciences previously announced its plan to build a miniGTL plant, designed in a modular nature, which will allow the matching of the equipment to the quantity of natural gas, as well as allow for portability if gas flow declines over time. The company estimates that a miniGTL plant producing approximately 1,000 barrels per day of transportation fuel can be contained in as few as 60 modules. A modular design enables rail car or truck transportation and installation to

remote sites with limited infrastructure. Modular construction additionally will allow the company to manufacture in low cost production centers and then transport the modules to the gas field, resulting in a substantial cost savings over on-site construction.

Unlike large scale GTL plants, such as those developed by Royal Dutch Shell and Sasol that require large gas fields, a miniGTL plant in the 1,000 to 2,000 barrel per day range can be built to monetize small to medium size fields, which account for nearly 40% of gas fields in the world. Read more at: http://www.marketwatch.com/story/carbon-sciences-enters-into-technical-services-agreement-with-fluor-2013-01-29

DOE-Supported Project Advances Clean Coal, Carbon Capture Technology Ohio State Researchers Show Viability of Advanced Chemical Looping Process"

Power Engineering Magazine, January 30, 2013

The following information was released by the U.S. Department of Energy, The National Energy Technology Laboratory (NETL):

Researchers at The Ohio State University (OSU) have successfully completed more than 200 hours of continuous operation of their patented Coal-Direct Chemical Looping (CDCL) technology - a one-step process to produce both electric power and high-purity carbon dioxide (CO_2). The test, led by OSU Professor Liang-Shih Fan, represents the longest integrated operation of chemical looping technology anywhere in the world to date.

The test was conducted at OSUs 25 kilowatt thermal (kWt) CDCL combustion sub-pilot unit under the auspices of DOEs Carbon Capture Program, which is developing innovative environmental control technologies to foster the use of the nation's vast coal reserves. Managed by the Office of Fossil Energy's National Energy Technology Laboratory, the specific goal of the project is to develop a CO_2 capture and compression technology that can reduce the capital cost and energy penalty of CO_2 capture by more than 50%; that is, CO2 capture at less than $40 per metric ton when integrated into a new or existing coal fired power plant. The successful test moves chemical-looping a step closer to full scale. Read more at: http://www.power-eng.com/news/2013/01/29/doe-supported-project-advances-clean-coal-carbon-capture-technology-ohio-state-researchers-show-viab.html

*** Related news…

*** "New Coal Technology Harnesses Energy Without Burning, Nears Pilot-Scale Development"

Newswise (press release), February 6, 2013

Newswise — COLUMBUS, Ohio—A new form of clean coal technology reached an important milestone recently, with the successful operation of a research-scale combustion system at Ohio State University. The technology is now ready for testing at a larger scale.

For 203 continuous hours, the Ohio State combustion unit produced heat from coal while capturing 99 percent of the carbon dioxide produced in the reaction.

Liang-Shih Fan, professor of chemical and biomolecular engineering and director of Ohio State's Clean Coal Research Laboratory, pioneered the technology, called Coal-Direct Chemical Looping (CDCL), which chemically harnesses coal's energy and efficiently contains the carbon dioxide produced before it can be released into the atmosphere.

"In the simplest sense, combustion is a chemical reaction that consumes oxygen and produces heat," Fan said. "Unfortunately, it also produces carbon dioxide, which is difficult to capture and bad for the environment. So we found a way to release the heat without burning. We carefully control the chemical reaction so that the coal never burns—it is consumed chemically, and the carbon dioxide is entirely contained inside the reactor." Read more at: http://www.newswise.com/articles/new-coal-technology-harnesses-energy-without-burning-nears-pilot-scale-development

*** "A Cleaner Way to Use Coal"

A technology for generating electricity from coal without pollution achieves a milestone.

By Kevin Bullis, *MIT Technology Review,* February 7, 2013

Coal is abundant and cheap, but burning it is a dirty business. This week researchers at Ohio State University announced a milestone in the development of a far cleaner way to use the energy in coal—a process called chemical looping that has the potential to reduce or eliminate a wide range of pollutants, including carbon dioxide and smog-forming nitrogen oxides.

One version of the technology ran continuously for over a week in a 25-kilowatt test facility, the researchers reported, the longest any such process has run. The successful test clears the way to ramp up the technology in a one-megawatt demonstration plant that's being planned in collaboration with the energy company Babcock and Wilcox.

In ordinary coal plants, coal is pulverized to make a fine powder and then burned in air to produce steam to drive turbines. This process makes very hot flames that can create the pollutant nitrogen oxide, and the carbon dioxide generated is difficult to isolate and capture because it makes up only a small fraction of the exhaust gases.

In chemical looping, coal doesn't react with air. Instead, it's exposed to oxygen-bearing materials such as iron oxide. The coal reacts with these materials, and the energy bound up in

coal breaks the bond between the oxygen and the iron. The reaction produces nearly pure carbon dioxide gas and iron metal (along with the mineral wüstite (FeO)). Electricity is generated when the iron is moved out of the reaction chamber and is essentially burned—that is, allowed to react with oxygen in air. This releases heat to produce steam. Read more at: http://www.technologyreview.com/news/510736/a-cleaner-way-to-use-coal/

*** "Coal Without Emissions? A Breakthrough in Chemical Combustion Technology"

By Erica Peterson, *WFPL*, February 21, 2013

Researchers at Ohio State University have developed a way to extract energy from coal without burning it, eliminating the greenhouse gases which are usually emitted from the process.

Usually when people talk about clean coal technology today, they're referring to Carbon Capture and Sequestration (CCS). This process uses some of the energy generated by burning the coal to separate the carbon dioxide that's emitted, and then injects it deep underground. This new process uses chemical combustion to separate the carbon dioxide, without using any additional energy. Then, presumably, the carbon dioxide would have to be either injected underground or used in enhanced oil recovery. The researchers are calling this process Coal-Direct Chemical Looping, or CDCL.

The process does still release coal ash, so it's probably not the "cleanest energy source there is," as Fox News proclaimed in its headline. But if this technology is actually viable and affordable, it could have a real effect on the coal industry. The real test will be to see if CDCL can operate on a large scale--and if it's cheap enough to convince coal-fired power plants to install it to keep burning coal instead of switching to natural gas.

The next step for the project is a larger-scale test at the Department of Energy's U.S. National Carbon Capture Center in Alabama. Link to article: http://www.wfpl.org/post/coal-without-emissions-breakthrough-chemical-combustion-technology

"NETL Research Results in New U.S. Patents"

Targeted News Service, *Utility Products*, February 15, 2013

The U.S. Department of Energy's National Energy Technology Laboratory issued the following news release:

Researchers at the U.S. Department of Energy's National Energy Technology Laboratory (NETL) received nine patents in 2012 for innovations that address the Nation's energy challenges. The patents include an integrated process for removing pollutants from fossil-fuel combustion systems; a metallurgical melting process to produce defective-free metal ingots; catalysts that make it easier to reform hydrocarbon fuels; stainless steel compositions and heat treatment processes to enhance stainless steel durability; a method to measure the circulation rate of coal solids in gasification reactors; and a process to separate and purify carbon dioxide (CO_2).

Deployment of these technologies will enhance energy efficiency, improve metallurgical processes, and allow for better emissions monitoring and control.

NETL pursues patent protection for NETL-developed technologies to protect U.S. taxpayers' investment in energy-related research. NETL's Technology Transfer Office manages the process, identifying those technologies with the greatest commercial potential. The office also fosters the development and deployment of new technologies by moving inventions from the laboratory into the commercial marketplace. Many innovations developed at NETL have been successfully transferred to industrial partners, including three of the technologies patented in 2012.

Brief summaries of NETL's 2012 patents, and licenses resulting from these patents, are presented below. NETL is seeking additional partners interested in licensing or further developing these technologies. Read more at: http://www.utilityproducts.com/news/2013/02/15/netl-research-results-in-new-u-s-patents.html

"Catacel to Present SSR Catalyst Technology at Two International Energy Events"

Azom.com, February, 18 2013

Catacel Corp. will display its compact, heat-exchanging catalyst technology at two upcoming major world energy forums. Catacel Sales Director Don Lensner and Japan agent Kensaku Gondai will exhibit at FCExpo, a major fuel cell and advanced energy event in Tokyo Feb. 25-28. The following week, Lensner will be joined by Catacel CEO Gary McDaniel at Nitrogen+Syngas in Berlin.

At each event, Catacel will display and discuss its thin foil substrate technology and its various applications in fuel reforming, syngas production, gas separation and tailgas combustion reactions. Catacel materials are specified in these reactions because they conduct reactions in less space, with less fuel consumed, and at lower reactor temperatures than the typical catalyst-infused ceramic media they replace.

This offers plant designers the ability to develop designs with a smaller footprint, and plant operators to operate their reactors cooler, at less expense and with longer life cycles for their catalyst charges, reformer tubes and furnace components. Read more here: http://www.azom.com/news.aspx?newsID=35758

"EmberClear finishes technical study on Mississippi gas-to-liquids proposal"

Hydrocarbon Processing, February 19, 2013

EmberClear has completed the technical feasibility study for a gas-to-liquids (GTL) project proposal in Natchez, Mississippi, the company said on Tuesday.

It is anticipated that if the project proceeds, it will be capable of producing 4,000 tpd of methanol or 14,000 bpd of gasoline.

This project's proximity to competitively-priced sources of natural gas and the Gulf Coast petrochemical hub creates the potential for attractive pricing, efficient access to markets and multiple modes of transportation, according to the company.

"It is our intent to take advantage of the recently available long-term natural gas contracts and address the desire for more domestic energy," said Nick Cohen, chief operating officer. "The USA may continue to import oil for decades, but facilities like ours could potentially reduce such imports while providing lower cost energy."

EmberClear noted that it has access to an 800-acre site along the Mississippi River where a commercial plant could be sited. Read more at:
http://www.hydrocarbonprocessing.com/Article/3157570/Latest-News/EmberClear-finishes-technical-study-on-Mississippi-gas-to-liquids-proposal.html

*** Related news…

*** "Natchez considered for gas-to-liquids plant site"

Jackson Clarion Ledger, February 20, 2013

NATCHEZ, MISSISSIPPI — EmberClear GTL MS has completed a technical feasibility study for a possible natural gas-to-liquids project on an 800-acre site along the Mississippi River in Natchez.

The Canadian company said in a news release Tuesday that if the project proceeds the plant could produce 4,000 tons of methanol per day or 14,000 barrels of gasoline per day.

Natchez Inc. Executive Director Chandler Russ told the Natchez Democrat that the company is a long way from making a commitment to the Natchez area.

"While we are definitely engaged with them, we have a long way to go before we reach something meaningful about this," Russ said.

The company's chief operating officer, Nick Cohen, said the Natchez site is served by American Midstream's Midla pipeline system, which intersects three interstate gas pipelines, providing the company with the option to source gas from virtually anywhere in Texas and Louisiana, as well as parts of Oklahoma. Read more at:
http://www.clarionledger.com/viewart/20130220/NEWS/130220030/Natchez-considered-gas-liquids-plant-site-

"Oxford Catalysts Calumet Project Update"

OilVoice, February 21, 2013

Calumet Project Update

Oxford Catalysts Group (OCG.L), the modular Gas-to-Liquids (GTL) technology innovator, is pleased to provide an update on the Calumet Gas-to-Liquids project announced on 7 September 2012.

Ventech Engineers International LLC (Ventech), specialists in modular processing plants with whom the Group has been working on this project, has now completed the plant design and provided a fixed price quote for the modules. Calumet has confirmed that the project economics look “strong”.

At the same time, Calumet’s appointed third-party owner’s engineer finished a thorough review of the Group’s technology, as well as Ventech’s GTL design and other intended technology components. As a result, Calumet has concluded that the technology “is fantastic”.

Calumet now plans to progress with the more detailed engineering and market analysis for a plant of approximately 1,400 bpd. At the conclusion of this study, which is expected to last approximately six months, Calumet will be in a position to decide on proceeding with fabrication.

Roy Lipski, CEO of Oxford Catalysts Group, said: “This is an exciting development for Oxford Catalysts. The project with Calumet will be the only commercial GTL plant in North America to move into front end engineering, other than Sasol’s project in Louisiana. If it continues on its current schedule, it will be the first GTL plant to be operational in North America, and the only commercial smaller scale GTL anywhere in the world. Read more at:
http://www.oilvoice.com/post/Oxford_Catalysts_Calumet_Project_Update/67879496a4.aspx

"Steve Frobouck, Andy Kicinski propose $1B gas-to-liquids facility"

By Anya Litvak, *Pittsburgh Business Times*, February 22, 2013

The duo behind one of the region's first Marcellus Shale wastewater processing plants wants to build a gas-to-liquids facility from which natural gas would be turned into diesel fuel.

Steve Frobouck, president of American GTL Energy, and Andy Kicinski, president of Reserved Environmental Services, are proposing what would be the second GTL plant in the Marcellus region. The price tag for the 15,000 barrel-per-day facility is pegged at about $1 billion, so the pair is looking for a major corporate partner. Read more at: http://www.bizjournals.com/pittsburgh/print-edition/2013/02/22/frobouck-kicinski-propose-gas-liquids.html

"Foster Wheeler awarded study contract"

By Stuart Radnedge, *Gasworld.com*, February 23, 2013

Foster Wheeler has announced that its' Global Engineering and Construction group has been awarded a study contract by the Energy Technologies Institute (ETI).

The five-month-long study will assess the economics of flexible power generation systems which involve the production of hydrogen from coal, biomass or natural gas, the intermediate storage of hydrogen (for example in underground salt caverns) and the production of power in flexible turbines. Foster Wheeler will execute the study in collaboration with the British Geological Survey.

The value of Foster Wheeler's contract was not disclosed and will be included in the company's first-quarter 2013 bookings.

The study commissioned and funded by the ETI, will look to map suitable hydrogen storage salt cavern sites in and around the UK. The sites, which tend to be located inland or up to 25 miles off the UK coastline, need to be of sufficient size, depth, location and quality to be considered for hydrogen storage.

According to ETI, flexible power generation systems, such as those to be studied, could provide a valuable contribution to the future energy mix in the UK, filling the gap between base-load nuclear plants and renewable power generation. Such systems would also capture and store carbon dioxide which would otherwise be released into the atmosphere. Read more at: http://www.gasworld.com/news/regions/west-europe/foster-wheeler-awarded-study-contract/2001821.article

"EPA approves use of camelina oil as biodiesel feedstock under RFS"

By Jordan Godwin, *Platts*, February 25, 2013

Biodiesel producer sources applauded the US Environmental Protection Agency Monday after the EPA finalized its rule to approve camelina oil as a low-carbon feedstock under the Renewable Fuel Standard.

"This decision adds to the growing list of biodiesel feedstocks that meet the EPA's standards for Advanced Biofuel and gives us yet another option for producing sustainable, domestic biodiesel that displaces imported oil," said Anne Steckel, vice president of federal affairs for the National Biodiesel Board, in a statement. "This is important for our energy security, for our economy and for addressing climate change, and we thank the EPA for conducting a thorough and fair review."

The RFS requires a 50% greenhouse-gas emissions reduction for qualifying biomass-based diesel or advanced biofuel. The rule addition -- published on the EPA's website Monday -- adds camelina oil as a new feedstock for biodiesel and renewable diesel blending, which includes jet fuel and heating oil.

Multiple biodiesel producer sources agreed Monday that the new addition would allow for more possibilities of domestic feedstock blending. Read more at: http://www.platts.com/RSSFeedDetailedNews/RSSFeed/Oil/6195572

"Chromatin, Calgren partner on sorghum for ethanol production"

Staff, *Chicago Business Journal*, February 25, 2013

Chromatin Inc., a developer of crop breeding technology, has agreed to help Californian ethanol producer Calgren Renewable Fuels develop a local supply chain for sorghum used in the production of fuel ethanol and distiller's grains.

The multi-year agreement covers up to 30,000 acres of sorghum grain to be grown and supplied to Pixley, Calif. -based Calgren, which produces more than 55 million gallons of ethanol a year. Financial terms of the deal weren't disclosed.

Chicago-based Chromatin said it is working with California growers who are attracted to sorghum's water efficiency and tolerance to heat, as well as the cost benefits that come from reduced fertilizer use. In addition, the residue left over from the harvest of sorghum grain can be used as high quality animal feed, or as a feedstock for biogas or cellulosic biofuel production. Read more at: http://www.bizjournals.com/chicago/news/2013/02/25/chromatin-calgren-partner-on-sorghum.html

"Colorado ethanol producer Front Range Energy moves from corn to woody biomass"

By Jon LeSage, *Autoblog*, February 26, 2013

The Environmental Protection Agency continues to give the green light to E15, but the biofuel doesn't have to come from corn ethanol. The exact source of the ethanol in gasoline – whether its 10 percent ethanol (E10) or 15 percent (E15) – isn't impacting the E15 debate, it does in the "food vs. fuel" debate, and that's why a potential solution coming out of Colorado caught our eye.

Ethanol producer Front Range Energy, based in Windsor, CO, has successfully tested a new process to make ethanol from waste wood. The company has a patented technology for making fuel from woody biomass instead of corn, and is the second major US ethanol producer to do so. Front Range will begin commercial production next year and plans to convert seven percent of its ethanol production from corn to woody biomass during that time. Switching over to that much biomass will reduce corn consumption by about 1.2 million bushels a year. Read more at: http://green.autoblog.com/2013/02/26/colorado-ethanol-producer-front-range-energy-woody-biomass/

"NACS Publishes Assessment of Fuels Market Through 2040"

NACS Online, February 26, 2013

ALEXANDRIA, Va. – Liquid fuels will continue to be the dominant fueling option for drivers for the next two-plus decades, but the composition of these fuels will undergo significant change, according to a report released by the National Association of Convenience Stores (NACS).

The new "Future of Fuels 2013" (PDF) report released today by NACS analyzes projections made by the U.S. Energy Information Administration (EIA) in its 2013 Annual Energy Outlook. NACS publishes the annual industry analysis to help retailers understand where the market is heading and which fuels are likely to be the dominant products consumed in the coming years so that informed investment decisions can be made.

The market share of liquid fuels (gasoline, diesel fuel and E85) will maintain an overwhelming 99.1% share of the fuels market in 2040, according to the NACS report. However, the volumes of liquid fuels sold will change as fuel efficiency will increase and overall gasoline demand will fall 18.4% by 2040.

"For fuels retailers, there are both positive news and concerns in the projections. The positive news is that liquid fuels will continue to dominate and these fuels are largely compatible with today's fuels infrastructure. The concern is that there will be significant changes in which fuels are sold, and these changes will not be driven by consumer demand but by government regulation," said NACS Vice President of Government Relations John Eichberger, who authored the NACS report. Read more at:
http://www.nacsonline.com/NACS/News/Daily/Pages/ND0226132.aspx

"Range Resources announces 2012 production results"

By Andrew Gretchko, *Pittsburgh Post Gazette, PIPELINE,* February 27, 2013

As the gas boom stemming from the Marcellus Shale continues, so do Range Resources' profits, the large Texas-based oil company announced this afternoon. Range Resources has focused much of its resources on Pennsylvania's shale hotbed, making them a staple in the development of the state's shale gas and oil.

Range Resources saw its total fourth quarter oil and NGL volumes increase by 41 percent. The annual production of 753 Mmcfe per day showed a 36 percent increase over the previous year. Some of this can be attributed to declining lease operating costs which dropped by 32 percent compared to 2011.

"Range continued to make significant progress in the Marcellus Shale during 2012 as we continued to grow production and reserves and delineate our sizable acreage position while expanding our current and future marketing and transportation capabilities for natural gas and NGLs," said the company in a statement issued earlier today.

During the fourth quarter, the Southern Marcellus Shale Division brought 30 horizontal wells online alone, taking advantage of the liquid-rich area of southwest Pennsylvania. An additional eight wells were drilled and cased in the northeast Marcellus during the fourth quarter. The company met its year-end production target of 600 Mmcfe per day. Read more at: http://pipeline.post-gazette.com/news/archives/25074-range-resources-announces-2012-production-results