

### **Nanocellulose Update**

As the pulp and paper and related forest products industries seek ways to adapt to the new realities of digital communication and decreasing demand for traditional products, nanocellulose continues to attract the attention of the R&D community. The material, whether in crystalline or fibrillar form, has unique mechanical and optical properties that hold promise for a variety of applications. According to Celluforce, a pioneer in the manufacture of nanocrystalline cellulose, its potential applications are myriad. They derive mainly from the material's high strength and unique optical properties. Examples include biocomposites for bone replacement, advanced reinforced composite materials, iridescent pigments and coatings, and many others.

Notable developments include news items highlighting the material's potential biomedical and industrial applications. Among the former is its use as an antioxidant, which gained attention in 2012 when high school student Janelle Tam paired nanocrystalline cellulose with molecules of buckminster fullerene, carbon molecules resembling balls. The combination proved to be an effective antioxidant, sucking up free radicals and neutralizing them. More recently, the purveyors of a commercial nanocellulose product ('Revetrin') claim that the product is a powerful antioxidant that slows and reverses the aging process by trapping harmful free radicals. (See <http://www.prweb.com/releases/2015/02/prweb12521394.htm>). According to the web site, "There is an internationally accepted way to measure the effectiveness of antioxidants, called the 'Oxygen Radical Absorbent Capacity,' ... and Revetrin's score is off the charts. For example, Vitamin C, a well-known and popular antioxidant has a score of 87, and Vitamin E scores a 56. In comparison, Nano Crystalline Cellulose has an astounding score of 19,765." The potential for other biomedical applications is surveyed in "Nanocellulose in

biomedicine: Current status and future prospect," by Ning Lin and Alain Dufresne of the International School of Paper, Print Media and Biomaterials in Grenoble, France (European Polymer Journal, Vol. 59, pages 302 -325, October 2014; see <http://www.sciencedirect.com/science/article/pii/S0014305714002493>). Among the applications described are: tissue bioscaffolds for cellular culture, drug delivery, enzyme immobilization, blood vessel replacement, soft tissue replacement, skin repair, and antimicrobial substrates. Interestingly, the article does not mention antioxidant applications.

In the category of potential industrial application is last week's announcement by Pulp and Paper Canada (PPC) that "CelluForce has received a contribution of \$4 million from Sustainable Development Technology Canada (SDTC) to optimize the extraction process of cellulose nanocrystals (also called nanocrystalline (sic) cellulose or NCC) from dry wood pulp and develop applications for its use in the oil and gas sector." PPC further states "According to the SDTC funding announcement, NCC may play a role in suspension methods for extracting oil out of the ground. These methods are currently limited as to where they can be applied. Under some conditions, traditional suspensions break down: valuable resources fall out of suspension and do not achieve their function, SDTC explains. When NCC is added to the suspensions, they remain cohesive even under extreme conditions. Moreover, the addition of NCC reduces the volume of water and pressure needed to carry out the extraction. The enhanced characteristics that NCC imparts to the suspensions should provide opportunities for extracting resources in areas where that is not currently possible."

CelluForce will partner in this project with Schlumberger Technology Corp., a supplier of services to the oil and gas sector.

## **Trend Indicators from Industry Intelligence Inc.**

[Industry Intelligence Inc.](http://www.industryintel.com) has provided market intelligence to more than 600 companies worldwide since it began as Forestweb in 1999. Industry Intelligence delivers a daily report featuring news of the paper and forest products industries. For your subscription visit: <http://www.industryintel.com>

Below is a sampling of recent Industry Intelligence headlines, chosen to mirror significant trends and other interesting developments in and around the paper and forest products industries.

***GP's Brewton, Alabama, mill called 'economic coup' by Business Alabama, noting US\$375M project at the linerboard and cartonboard mill will upgrade recovery boiler system by 2016, increase energy efficiency, and aims to secure mill's existing 450 jobs***

During the peak of construction, the project will employ about 600 people. While the mill's workforce will not be expanded, the project aims to secure the mill's existing 450 jobs.

***Tranlin Paper expects to start building its US\$2B agricultural waste-based pulp, paper and fertilizer facility in Virginia in late 2016, with production to start in 2017; local officials impressed with environmental standards of company's mill in China***

The US\$2 billion facility will make paper from agricultural waste and its primary waste byproduct will be made into fertilizer.

***Södra Cell Tofte acquired by European renewable energy company Statkraft, and JV called Green Fuel formed with Södra; JV will seek cost-effective technology to produce biofuels, with eye to using former pulp mill site at Tofte, Norway***

The location already has an established infrastructure to handle large volumes of wood and it is located centrally in eastern Norway, with an excellent deep-water harbor.

***Domtar contracts Valmet to supply equipment for converting uncoated freesheet paper machine at Ashdown, Arkansas, mill to fluff pulp production; contract includes new wet end, reel and winder, upgrades to existing cylinder dryer section, other components***

The delivery is part of Domtar's USD 160 million project to re-purpose a paper machine. The rebuilt machine is scheduled to begin operation in the third quarter of 2016.

***FPAC president expects paper mills will have to take downtime, lay off employees if Canadian Pacific Railway strike continues, notes that typical paper mill will need about 40 trucks a day to move its production in place of about one-third fewer rail cars***

The strike was deemed likely to disrupt major industries throughout North America, including automakers, oil companies, paper businesses, lumber suppliers and agriculture and mining companies.

*(Editor's note: The Financial Post reported on February 16 that "CP Rail strike ends after only one day; workers agree to binding arbitration as Ottawa threatens back-to-work legislation.")*

***Fortress Paper supports Canada's decision to advance trade dispute with China over duties on Canadian dissolving pulp imports by taking it to WTO, says CEO; request for consultations with China does not appear to have resolved the dispute, says company***

The announcement escalates Canada's October 2014 request in for consultations with China.

***University of New Brunswick receives US\$98,271 in federal funding to develop drones to monitor and manage Canada's forests; researchers will collaborate with industry partners on use of drones to identify pest outbreaks, conduct aerial surveys***

The drones will be able to monitor pest outbreak and take aerial surveys in a more cost-effective manner and with less risk to personnel and the environment.

***Global pulp and paper chemicals market forecast to grow at 2.8% CAGR throughout 2014-2019 period, driven by rising demand for specialty papers in packaging, printing applications, report finds; Asia-Pacific to emerge as region with most growth potential***

Increasing literacy rates in emerging economies and rising demand for high print quality and performance are expected to drive the market.

***Tembec's newsprint business benefiting from decline in Canadian dollar, says CEO, noting that mills that might have been high-cost Canadian producers now***

***'heck of a lot more competitive,' while some US mills are 'not sitting in such a great place'***

The Canadian dollar has fallen 15 per cent relative to the U.S. dollar in the past seven months.

***US biomass-fueled energy capacity amounts to 16.10 GW, or 1.38% of country's power-generating capacity, as of the end of December 2014; 58 biomass power generation units with total generating capacity of 254 MW added in 2014: FERC***

Fifty-eight new biomass power generation units with a combined capacity of 254 megawatts (MW) came online in the U.S. in 2014, compared with 142 biomass units with a combined capacity of 858 MW in the previous year.

***Packaging trends in 2015 to include sustainable designs, use of renewable materials in food containers; examples include Elopak cartons made of 75% renewable paperboard, Tetra Pak cartons with sugarcane-derived LDPE films, Braskem's bio-based LDPE, more***

Brazilian petrochemical firm Braskem's bio-based LDPE has physical and chemical properties similar to those of conventional fossil-fuel derived polyethylene.

***Cascades completes sale of its North American boxboard operations to Graphic Packaging for C\$44.9M; units included in transaction are located in Quebec, Manitoba and Ontario provinces of Canada***

This reflects Cascades' intention to refocus its activities on the strategic sectors in which it excels.

***CEPI's preliminary data shows about 0.2% year-over-year drop in 2014 paper and paperboard production in CEPI member countries, to about 91 million tonnes; pulp output was down about 4.3% while utilization of paper for recycling was unchanged***

Total production was around 91 million tonnes, 10% below the pre-financial crisis level. The decrease in graphic paper demand was offset by increases in packaging paper and board.

***Finnpulp to build €1.4B softwood pulp mill in Kuopio, Finland, with annual capacity of more than 1 million tonnes; project has been in planning stages for three years, environmental impact assessment process to start in spring of 2015***

Although Metsä Group is planning a pulp mill in Äänekoski, Finnulp believes there is room for the two huge softwood mills in Finland.

***ArborGen's genetically modified loblolly pine will not be regulated by USDA, as organisms used to modify are not plant pest risk; 'unprecedented' decision alarms GMO critics, who say USDA should have assessed other potential risks***

The modified loblolly pine has higher wood density, a characteristic associated with superior strength and durability in lumber.

***Mobile technologies, including image recognition, smart inks, augmented reality and near-field communication, are poised to overtake the interactive paperboard packaging market, streamline the consumer experience, says Paperboard Packaging Council***

The fate of the QR code remains unclear, but several new mobile technologies are poised to overtake the interactive packaging market: image recognition, smart links, augmented reality and near-field communication.

***AF&PA presents Forest & Paper Industry Distinguished Service Award to Dr. Ron Yeske, former president of National Council for Air and Stream Improvement; under Yeske's leadership, NCASI advanced issues facing the industry, says AF&PA CEO Donna Harman***

Yeske had earlier served as vice president of the Institute of Paper Science and Technology, which, together with Georgia Tech and the Alfred P. Sloan Foundation, founded CPBIS.

***Metsä's proposed bio-product mill in Äänekoski, Finland, receives environmental and water-intake permit that includes the mill, bark-drying and bark-gasification plant, digestion plant, wastewater generated in mills, wastewater treatment***

If the decision is made to proceed, the mill would be the largest ever investment in the forest industry in Finland. It would have an annual pulp production capacity of 1.3 million tonnes and would replace the mill currently operating in Äänekoski. Production would begin in 2017.

***MeadWestvaco, RockTenn to merge, creating US\$16B packaging company; total annual synergies of US\$300M expected to be achieved over three years***

The transaction requires the approval of shareholders of both MWV and RockTenn and is subject to receipt of certain regulatory approvals and other customary closing conditions.

***North American newsprint production capacity reduced by about 1.25 million tonnes/year in past 13 months, as market continues to decline domestically and overseas; export market more competitive due to weak currencies outside US, says PPPC official***

But a RISI analyst said he doesn't foresee large 2015 capacity cuts beyond what has been announced.

***European graphic paper shipments in November decline 7.0% from a year ago, to 2.948 million tonnes, with all sectors showing decreases: Euro-Graph***

Total European demand was 2.539 million tonnes, falling 6.6% year-over-year.

***China produces 10.112 million tonnes of machine-made paper and paperboard in November 2014, bringing year-to-date total to 109.814 million tonnes, an increase of 3.4% year-over-year***

US production in 2011 was approximately 75 million tons.

***Readers return to print after popularity of e-books***

Deloitte predicts that print will make up more than 80% of all book sales revenue worldwide in 2015. The number of print book sales in Australia has risen 2.2% year-over-year, marking the first increase since 2009.

***J.C. Penney resurrects print catalog after five-year absence***

J.C. Penney joins other retailers that have embraced print catalogs to varying degrees, from [Restoration Hardware's 17-pound stack of catalogs](#) and [IKEA's 200 million catalogs to luxury e-commerce sites](#) expanding their reach with catalogs resembling magazines.

***GP plans to invest US\$70M at its paper mill in Palatka, Florida, to reduce water use by about 30%, upgrade mill's power generation equipment***

The mill employs 900 people from Palatka and the surrounding areas.

***Deutsche Post DHL plans to create as many as 10,000 new jobs by 2020 in parcel delivery, and by 2025 the total number of new positions could reach***

***20,000; existing employment contracts shall remain unaffected, company says***

This is a result of continued sustainable growth in the parcel business.

## ***AF&PA Statistics***

Since our last reporting of American Forest and Paper Association statistics releases, the Association has issued its December printing and writing report, as well as its January kraft paper, paperboard and containerboard reports.

### **Printing and Writing**

Total shipments decreased 4 percent in December compared to December 2013, with total paper inventories flat compared to November. Uncoated free sheet (UFS) paper shipments in December decreased 8 percent compared to December 2013. Shipments for the year were down 9 percent relative to 2013. Imports of UFS increased 4 percent in November and were up 21 percent year-to-date compared to the first eleven months of 2013. December coated free sheet (CFS) paper shipments increased 1 percent compared to 2013. Annual shipments of coated freesheet grades in 2014 decreased 2 percent compared to the previous year. Exports of CFS papers were down 6 percent for the year compared to the first eleven months of 2013, with imports increasing 1 percent in November and 4 percent for the year. Uncoated mechanical (UM) paper shipments decreased 2 percent in December but were up 4 percent for the year compared to 2013. Imports of UM papers through November were down 6 percent, with exports 18 percent below the 2013 level. Coated mechanical (CM) shipments in December increased 4 percent relative to December 2013 and were down 4 percent for the year. Exports of CM grades were essentially flat in November but were up 6 percent compared to the first 11 months of 2013. Imports were down 16 percent through November.

### **Kraft Paper**

Total shipments were 124.4 thousand short tons, 3.1 percent lower than December 2014. Bleached kraft paper shipments decreased slightly to 9.4 thousand tons compared to December's 9.7, while unbleached kraft paper shipments decreased from 118.7 thousand tons to 115. Overall, shipments for the first month of 2015 were 6.3 percent lower than January 2014. Total

month-end inventories increased to 83.3 thousand tons.

### **Paperboard**

Total boxboard production decreased 0.2 percent when compared to January 2014 but increased 3.9 percent from December. Unbleached kraft boxboard production decreased over the same month last year and decreased compared to December. Total solid bleached boxboard & liner production increased when compared to January 2014 and increased compared to December. The production of recycled boxboard increased compared to January 2014 and increased when compared to December.

### **Containerboard**

Containerboard production was 1 percent higher compared to December 2014 and 3.9 percent higher than January of last year. The month-over-month average daily production was 1 percent higher. The containerboard operating rate increased to 96.2 percent from December's 94.7 percent.

The full reports can be purchased by contacting Caroline Nealon, [Statistics\\_Publications@afandpa.org](mailto:Statistics_Publications@afandpa.org) or 202-463-2448.

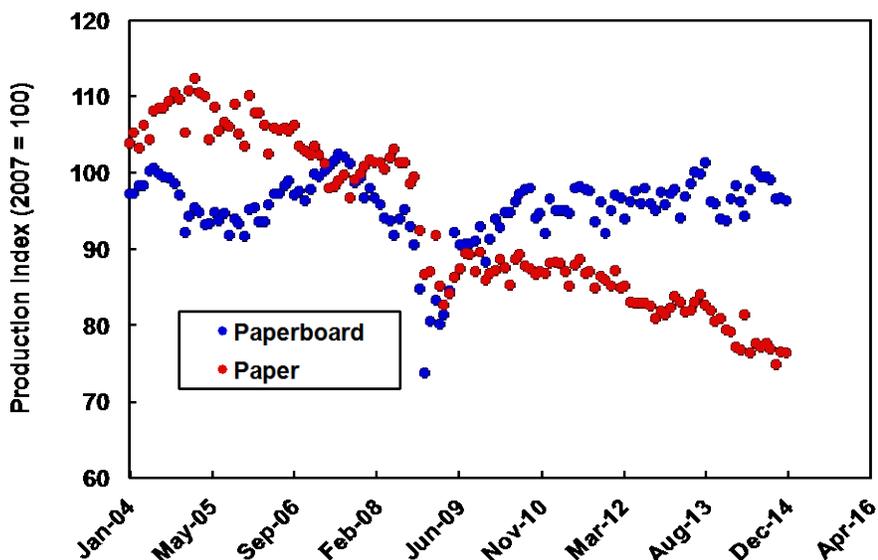
### **Paper Quotes**

“It's time that we start paying down our debt; it's a good time to take a timeout.” – *Republican Senator Tom Tiffany, a member of Wisconsin's budget-writing Joint Finance Committee, following the announcement of Governor Scott Walker's plan to freeze spending for conservation-driven land purchases. (Wisconsin taxpayers are reportedly spending \$1.6 million a week to pay the debt service for past land purchases.)*

“The moratorium will be devastating to land conservation in Wisconsin.” – *Mike Carlson, external relations director for Gathering Waters Conservancy, referring to Governor Walker's plan to freeze land purchases.*

### **Statistics Corner: Paperboard and Paper Production Indices**

Figure 1 below shows that paperboard production, after recovering from the effects of the 2008 recession, has remained robust while paper production has sagged. December 2014 production of paperboard stood at more than 99% of its July 2010 value. This contrasts with paper production, which in December 2014 was less than 86% of its July 2010 value. ■



**Figure 1. Paperboard and Paper Production Indices** (Source: Federal Reserve Board)