

## Research & Development in the Pulp and Paper Industry

By Patrick McCarthy

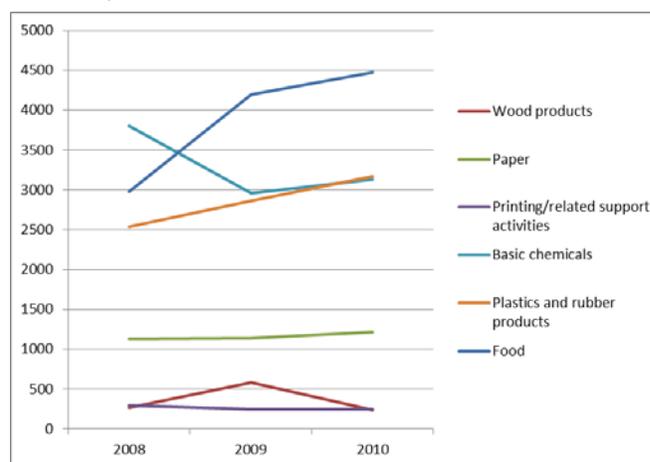
The July 31, 2014 newsletter reported on a recent Paper 360° article (“Pulp and Paper Innovations,” Paper 360°, July/August 2014, pages 12-16, 36) that highlighted eight significant innovations (aseptic packaging, chlorine-free bleaching, high filler content paper, twin wire forming retrofits, extended nip presses, highly energy efficient chemical recovery boilers, millwide control systems, and production of biochemicals). As noted in the article, the industry’s record of innovation has helped the industry meet increasing competitive, environmental, and energy challenges.

This article takes a more recent and broader look at the industry’s research and development activities and how these compare to other manufacturing sectors. The National Center for Science and Engineering Statistics, National Science Foundation, published a lengthy report in September 2013 (“Business Research and Development and Innovation: 2008–10”) that provides detailed information on the domestic and international research and innovation activities of industrial sectors.

### Research and Development

Figure 1 reports the worldwide amount of R&D that the pulp and paper sector and benchmark sectors performed in 2008 through 2010. In 2008, the largest R&D expenditures were in basic chemicals (3.8 billion), food (2.9 billion), and plastics and rubber products (2.5 billion) sectors. The paper manufacturing sector was significantly below this at 1.1 billion in 2008. In 2010, basic chemicals, food, and plastics and rubber product sectors remain high but the graph reveals some dramatic shifts during the 3-year period. Worldwide R&D in the food industry increased 50% but decreased 18% in basic chemicals.

The plastics and rubber sector, a competitive sector for pulp and paper, increased 25% compared to a 7% increase in the paper sector. During this 3-year period, worldwide R&D for the paper sector remained relatively low and flat.

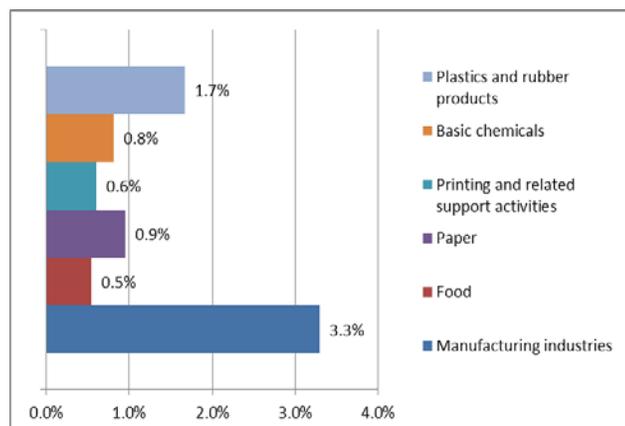


**Figure 1. Worldwide R&D paid for by the company and performed by the company and others , 2008 – 2010**

For the paper industry, 72% of the sector’s R&D occurs domestically, down from 79% in 2008 but generally similar to the food (79%), textile (76%), basic chemicals (72%), and plastics (76%) sectors, while 92% and 82% of the printing and wood products sectors’ R&D occurred domestically in 2010.

Figure 2 reports worldwide R&D conducted in 2010 as a percentage of the sector’s worldwide sales. For the manufacturing sector, R&D accounted for 3.3% of worldwide sales, considerably greater than the paper sector and its benchmark industries. R&D in the paper manufacturing sector was 0.9% of sales (the average for the reported benchmark sector). Although less than the manufacturing sector, as a percent of worldwide

sales, R&D expenditures in the plastics and rubber products sector (1.7%) was nearly twice that in the paper sector.



**Figure 2. Worldwide R&D as a Percentage of Worldwide Sales, 2010**

### Product and Process Innovation

Another indicator of innovative activities is the introduction of new products and new manufacturing processes. For the paper sector, Table 1 provides information on the proportion of surveyed companies that engaged in product or process innovation and the type of innovation.

**Table 1. Product and Process Innovation**

	% of Companies
Product Innovation	
New Goods	14.20%
New Services	7.10%
Process Innovation	
New Manufacturing or Production Methods	10.30%
New Logistics, Delivery, or Distribution Methods	8.90%
New Support Activities	12.10%

Overall, 19.8% of companies in the paper manufacturing sector identified new or significantly improved product or process. From Table 1, 14.2% of pulp and paper companies introduced new goods compared with 7.1% of the companies that introduced new services. A similar proportion (8% - 12%) of companies engaged in various types of process innovation where the focus was more on logistics and support than on new production methods.

How does this compare with pulp and paper’s benchmark sectors (Food, Textiles, apparel, and leather products, Wood products, Printing and related support activities, Chemicals, Plastics and rubber products)? 27.7% of these companies, on average, introduced new products or significantly improved products or processes, a larger proportion than for the paper sector. The top performing sectors on these margins was the chemical (46.1%) and plastics and rubber products companies (34.0%).

In sum, the NSF Report offers an excellent overview of recent business research, patenting, and innovative activities and, as suggested here, provides a general basis for determining whether the pulp and paper industry is ‘research competitive’ with other sectors, particularly those sectors whose products are part of the paper industry’s supply chain (e.g. wood products, chemical) or whose products are direct competitors in the marketplace (e.g. plastics).

### New CPBIS Report on Economic Indicators

CPBIS has recently completed a new benchmark report (“Pulp and Paper Economic Indicators: A Comparative Analysis”, Patrick McCarthy and Aselia Urmanbetova). The 2014 annual report updates the benchmark analysis that CPBIS distributed last year and includes additional benchmark indicators. As in last year’s report, the 2014 report includes information on major economic indicators, including industrial production, capital stock and investment, employment and productivity, and price indices. This year’s benchmark update expands the information on energy indicators and includes new data on biofuels. In addition, this year’s report includes indicators on transportation and trade.

#### WHERE IT that information?

This year’s CPBIS Benchmark Report is nearly twice the length of last year’s report, reflecting the expanded coverage of information relevant for the industry. In contrast to many other industry reports and benchmark analyses, a major advantage of the CPBIS report is that all data come from public online sources and, importantly, include specific source citations. Although public data are ‘public’, actually locating the specific public data can be time-consuming and cumbersome. The report’s detailed source information enables one to quickly and easily navigate to the specific webpage that provides the data as well as other data relevant to the topic.

The 2014 CPBIS Report, "Pulp and Paper Economic Indicators: A Comparative Analysis", is available for \$70 on the CPBIS website:

<http://www.cpbis.gatech.edu/support/products>.

## **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 small sampling of recent Industry Intelligence headlines, chosen to mirror significant trends in and around the paper and forest products industries.

*The National Science Foundation has awarded a \$741,221 grant to cycleWood Solutions Inc., a technology company affiliated with the University of Arkansas, to commercialize single-use Xylobag – a plastic bag substitute that blends lignin, an abundant organic polymer that is most commonly derived from wood, with a compostable material.*

Lignin is a byproduct from paper mills and biofuel plants, so no additional trees or plants need to be harvested to produce Xylobags. The bag has been certified compostable by the Biodegradable Products Institute and will break down in as little as 12 weeks in a commercial composting facility. The National Science Foundation Phase II grant came through the Small Business Innovation Research Program, which allows federal agencies to stimulate technological innovation in the private sector by strengthening small businesses that meet federal research and development needs. The program is intended also to increase the commercial application of federally supported research results.

*Ever since the first article on the topic in 1975, the "paperless office" is always 10 years away. With demand for paper steadily decreasing, with most paper bills turning into e-bills, and companies and government offices striving for "paperless paperwork", the average American still uses 700 pounds of paper products a year.*

The Economist's article The Paperless Dilemma zeroes in on a single factor – easier consumption – once compiled and collected, saved and organized in

electronic media, information and other creative inputs are easier to consume, understand, and process once they are printed out. This is due primarily to the human physiology of reading.

*Sustainable Manufacturing and Advanced Biobased Materials are the two categories of technological need and opportunity identified by Agenda 2020 Technology Alliance announcing the launch of its new project, "Technologies for Advanced Manufacturing of Pulp and Paper Products."*

The project leverages extensive work by Agenda 2020 members and partners over the last year to identify and screen opportunities for major reductions in energy consumption and treated water discharges. The process will begin with open-forum sessions in Atlanta and Chicago: the Atlanta event will be held November 18. [Registration and Hotel for Atlanta Open Forum](#). The Chicago event is scheduled December 10. [Registration and Hotel for Chicago Open Forum](#).

*China imposed preliminary duties on imports of dissolving pulp from Canada of 13 % in November of 2013 and in April of 2014 they became permanent. These anti-dumping duties are resulting in significant loss of market for Canadian dissolving pulp producers.*

"This trade action has had a negative impact on several forest communities," said David Lindsay, President and CEO of FPAC. "Not only has this action had a negative impact on several forest communities across Canada, and hurt Canadian exports, but future jobs have also been impacted with the cancellation of previously- announced investments in dissolving pulp opportunities in Saskatchewan, Quebec, and Terrace Bay, Ontario."

*India's paper industry, rooted in its ancient history, is poised for stable long-term growth.*

India has 17% of the world's population, but it consumes just about 3% of paper globally. The per capita consumption of paper in India is at around 10 kg, which is well below the global average of 55 kg. With the growth in GDP and increase in literacy, paper consumption in India is forecasted to go up. Consumption of paper and related products in India is set to increase to 20 million tonnes by 2020, from the current level of 12 million tonnes.

*In its effort to protect PanPaper mill at Webuye, Kenya reintroduces higher import duty of 25% on paper, paperboard not made in East Africa Community countries.*

Pan Paper in Kenya reportedly bought by Raiply for US\$1; thought that at least a year of renovation work is needed before the brown kraft paper mill could reopen.

***APP China's chimneys do not release black smoke but purified steam and the polluted water is treated to the level of purity in which fish can survive.***

In fact, the whole factory area looks like a park with green trees and a fresh water fed from a creek in a mountain. "We spend 2.7 billion yuan (\$440.7 million) on the environment protection facilities in the factory," said Anthony Chang, president director assistant with Hainan Jinhai Pulp and Paper Co, a paper producer with APP. By the end of 2012, APP China had spent over 6 billion yuan in environmental protection facilities across the country.

***European corporate leadership is mindful of climate policies and social responsibility: Metsä Board is honored to be awarded a position in the CDP's Nordic Climate Disclosure Leadership Index (CDLI). Metsä Board achieved an excellent score of 98 out of 100 for the depth and quality of climate change data it discloses to investors and the global marketplace.***

High scores indicate that a company provides robust climate data and conveys a strong understanding of corporate climate-related issues. Only companies with a score in the top 10% are awarded a position in the CDLI, showing they have provided a high level of transparency in their disclosure of climate-related information.

***Wisconsin's paper industry is probably done with changes and consolidations, said Jeff Landin, president of Wisconsin Paper Council. Currently, there are more jobs available in Wisconsin's paper industry than there are graduates to fill them – a large number of people in technical jobs are reaching retirement age.***

In the past two years, Domtar Corp.'s paper mill in Rothschild, Wisconsin, hired 32 production employees and 10 salaried administrators, all of which replaced retiring workers. Demand is high and growing for workers in skilled trades, with demand especially high for electrical engineers, as there are fewer and fewer graduates in this field, however, younger workers are shying away from the industry because it is not perceived to be as secure. They also are not as interested in working 24-hour shift rotations.

***High drama around the anticipated closure of Verso's Bucksport paper mill in Maine: mill closure***

***spurred emotional outbursts and finger-pointing during Maine's governor race.***

All three candidates vying for the governor's seat in Maine released statements containing words "traumatic," "help" and "heartbreak." Verso is blamed for not alerting the local officials of its decision ahead of time and for disregarding all the help it received from the state and local governments in the forms of tax breaks and credits over time. The company is asked to stall closure and seek a buyer who would be able to keep the mill running or, at minimum, to keep the mill-adjacent energy center operating and providing energy to the local community. The closure is symptomatic of rising natural gas costs in the Northern region and is the third mill closure this year for Maine. 500 people will be affected directly by the closure.

## ***Paper Quotes***

"Most important are the nearly 900,000 men and women who make these products and manage the forests manufacturers rely on, without which we would not enjoy the quality of life that paper and wood products give us. To them, we say 'thank you.'" – Donna Harman, American Forest & Paper Association President and CEO, in celebration of National Forest Products Week, as proclaimed by President Barack Obama.

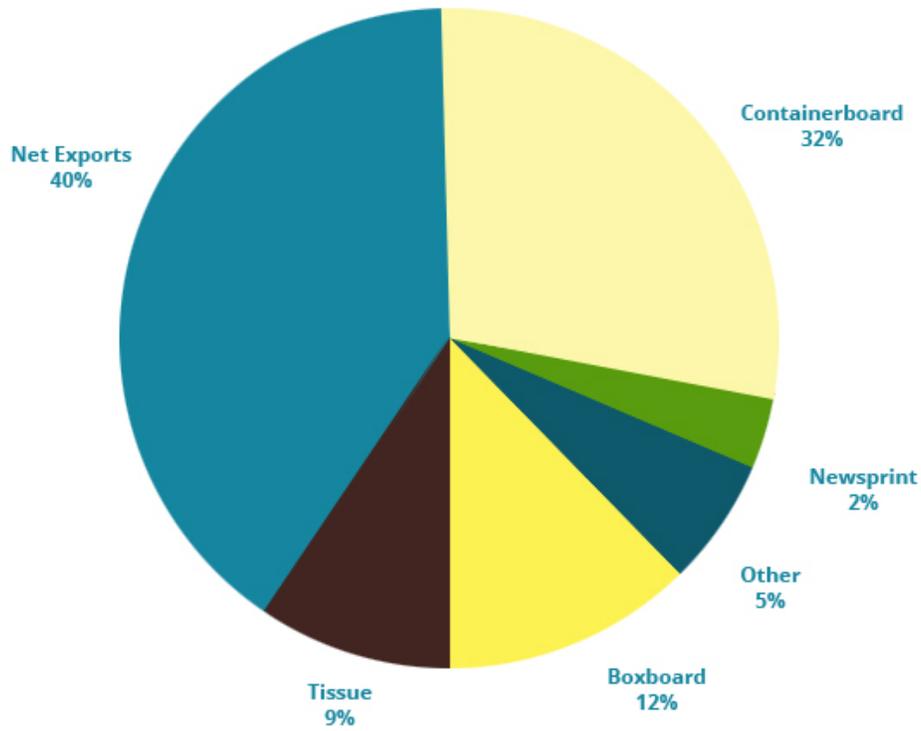
"As a top employer in 48 states, pulp and paper is very important to many communities across the U.S.," Turpin continued. "Developing its processes for even greater energy efficiency and additional reductions in environmental impacts will protect US jobs and promote energy efficiency and independence." — David Turpin, Agenda 2020's President and Executive Director.

## ***Statistics Corner: Recovered Paper***

The supply of recovered paper showed a slight increase in 2013, rising from 78,498 million tons in 2012 to 78,954 million tons, according to AF&PA. During the same period, the amount of recovered paper and paperboard experienced a small decrease from 51,092 to 50,128 million tons which led to a fall in the recovery rate from 65.1% in 2012 to 63.6% in 2013. Fueling the decline was a 6.3% decline in US recovered paper US exported.

The graph below identifies the destinations of recovered paper consumption in 2013. 60% of recovered paper goes into the production of other products, the largest component of which is containerboard (32%), followed by boxboard (12%),

and tissue (9%). International trade in recovered paper accounts for the 40% in the form of net exports to China and other importing countries.



**Figure 1. Where Recovered Paper Went in 2013** (Source: AF&PA, <http://www.paperrecycles.org/statistics/where-recovered-paper-goes>)