

# Agenda 2020 Reachable Goals Can Double P&P Industry's Cash Flow

*Among six technology deployment platforms, forest biorefinery technologies will likely be the most disruptive, changing the industry's basic model but offering many benefits.*

— BY BEN THORP AND DEL RAYMOND

The U.S. forest products industry has not consistently returned its cost of capital in the past decade. Mergers and acquisitions, while necessary for survival, have not solved the root financial issue. Consensus is building that our business model has to change.

Today, tropical hardwood mills, using fiber from cloned plantation trees that mature to 70 - 80 ft in six years (or less) are impacting the paper industry in this country in a way similar to our impact on the northern European industry when we learned to pulp the fast growing pine tree.

Europeans took a long time to respond to the impact of the southern pine tree. Their response included a more technologically advanced workforce, development of more technically efficient processes (especially energy), favorable tax negotiation, and advanced technology to make superior products. This took many decades. We need to respond better and faster.

In two parts, this article explores the goals and progress of Agenda 2020 projects that are bringing significant new technologies, applications, and approaches into commercial reality. The six platforms of Agenda 2020 outlined below in Part 1 of this series, collectively represent the U.S. paper industry's most hopeful and practical response to the serious challenges it faces today.

The second part, to be published in October issue of PaperAge, will look more closely at the forest biorefinery platform and its promises and progress to date. It will examine practical, existing technologies for improving the value of harvested wood prior to pulping and proven methods for increasing the value of spent pulping liquors. Specifically, Part 2 will explore how the near-future forest biorefinery can work within existing infrastructures and the hurdles and challenges that will have to be answered to finally get there.

## Agenda 2020

Agenda 2020 is headed by a U.S.-based CTO committee dedicated to using leveraged resources to develop and employ technology to improve paper industry economics and value to society. It started in 1994 when the American Forest & Paper Assn. (AF&PA) signed a compact with the department of energy. It has grown significantly in scope and accomplishment during the past decade. Agenda 2020 is structured into eight task groups aligning with six technology platforms:

- Technologically Advanced Workforce
- Superior Environmental Performance
- Sustainable Forest Productivity
- Fiber Recovery & Utilization
- New Forest Based Materials
- Wood/Composite Technologies
- Improved Energy Performance
- Breakthrough Technologies.

## Six Technology Platforms

Figure 1 shows the six Agenda 2020 technical platforms, one of which is the forest biorefinery. In its sim-



Figure 1. Agenda 2020's six deployment platforms includes one for the forest biorefinery.

plest form this means extracting value from that half of the log that has been virtually discarded or inefficiently converted to energy for the past 200 years. Current economics dictate that we must change this model, and modern technology is showing us ways to do this. Some of these ways may actually give us relative competitive superiority to recently built tropical hardwood pulp mills.

In 2003, there were 147 Agenda 2020 projects in DOE/Biomass, DOE/ITP, USDA Forest Service/CRESSES, and the Forest Products Laboratory, with a total 2003 resource allocation of more than \$50 million. Among the many projects that have moved into commercial status are:

- Worker training center of excellence
- Soluble PSA
- Methane DeNOx
- IntraMicron

The results in Table 1 below come from a portfolio management tool that was developed and tuned, with the help of the Gensight Group, to agenda 2020 activities in the forest products industry. It shows the potential increase in net cash flow that each platform can deliver, assuming complete development and implementation.

Agenda 2020 has completed enough projects to believe that 25% can be developed and implemented. This will increase net cash flow by more than \$8 billion annually. That is nearly double the average industry net cash flow for the past five years. Some estimates are much higher.

How credible is this? Let's examine a few recent accomplishments to gain a degree of calibration.

Figure 2 provides some details of the Methane deNOx boiler retrofit that is commercially available and is projected to reduce energy consumption in North America by 32 trillion Btu's. Based on last year's oil prices, that would amount to \$134 million per year.

Figure 3 gives some details of the project that makes

Figure 2. Methane deNOx accomplishments and potential savings.

Figure 3. Potential impact of new screenable PSA technology.


pressure sensitive adhesives more water soluble, with a potential energy saving in our recycling mills of 10 trillion Btu's and \$107 million based on last year's energy prices.

Figure 4 highlights the Borate Partial Auto Causticizing project that will result in a savings of 4.5 trillion Btu's if it is applicable to only ~25% of the lime kilns in North America. Based on last year's oil prices, this will result in an increased annual net cash flow of more than \$100 million.

Figure 5 defines how a company was founded on technology developed under the Agenda 2020 platform.

Platform	Net Cash (U.S. \$ MM)	TNRG BBL (MM Bbl/Yr)	C-Balance (MM Tons/Yr)	Jobs (M Jobs)
1. Advancing the Forest Bio-refinery	8,849.00	175.72	153.7	166.7
2. Technologically Advanced Workforce	2,180.00	16.56	7.6	200
3. Breakthrough Mfng Technologies	16,895.00	313.02	41.74	-10
4. Positively Impacting the Environment	416	39.98	14	0
5. Wood Products Revolution	4,902.00	13.67	0	20
6. Fiber Recovery and Utilization	1,200.00	13.66	10	0
<b>Overall</b>	<b>\$34,442.00</b>	<b>572,621</b>	<b>227.04</b>	<b>376.7</b>

Table 1. Potential net cash flow increase for six Agenda 2020 platforms.




### Recent Accomplishments Borate Auto Causticizing

- An Agenda 2020 sponsored project is developing the technology to commercialize borate-based partial autocauticizing.
- This will eliminate the recaust cycle as a bottleneck in selected kraft mills.
- Trials in mills have demonstrated that the decarbon reactions occur as predicted, the causticizing efficiency increases, less energy is required for calcining and causticizing, lime limited mills have reduced lime purchases, and the efficiency of pulping may increase.
- This technology may not be applicable to some mills. However, assuming that it is applicable to 50 of the 214 lime kilns, an energy reduction of 4.5 trillion Btu's and an increased cash flow of \$100 million is expected.
- One mill has converted to this process.

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Figure 4. Significant energy reductions are possible with Borate Auto Causticizing.




### Recent Accomplishments IntraMicron

- With funding from Agenda 2020, Auburn University developed new carbon-metal composites using pulp as a substrate to hold the composite materials in place.
- In July 2001, a start-up company, IntraMicron, signed an exclusive agreement with Auburn to commercialize products based on this technology.
- The initial market focus is on pocket-sized, foldable gas masks with extended useful life and very low pressure drop (easy breathing), which are now being marketed.
- IntraMicron also acquired the pilot paper machine to form the base structure, later burning off the cellulose and fusing the metal/carbon in a sintering process. Part of the agreement is that Auburn can use the pilot paper machine when not in commercial use.
- IntraMicron will also fund scholarships with income from the venture.

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Figure 5. IntraMicron/Auburn University carbon-metal composite project (using pulp as a substrate).




### Recent Accomplishments Technologically Advanced Workforce

- The Agenda 2020 Technologically Advanced Workforce Task Group (TAW) is establishing a National Network for Pulp and Paper Technical Training.
- The focus is high quality associate degree programs in pulp and paper technology. Targeted students range from entry level employees to incumbent workers. With funding from the National Science Foundation (NSF), the network presently links:
  - Alabama Southern Community College and Auburn University
  - Kennebec Valley Technical College and University of Maine
  - Lower Columbia College and University of Washington
  - Mid-State Technical College and the University of Wisconsin, Stevens Point
- Regional mills are benefiting from these training programs and are actively supporting further development. Partnering companies include:
 

Alabama River	Madison Paper Industries
Boise Paper Solutions	Nexfor-Fraser Papers
Domtar	SAPPI Fine Paper
Georgia-Pacific	Stora Enso
Longview Fiber	
Company	

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Figure 6. National Network for Pulp and Paper Training is creating associate degree programs in pulp and paper technology.



### The Forest Biorefinery

- Consists of three parts:
  1. Sustainable Forest Productivity
  2. Extracting Value Prior to Pulping
  3. New Value Streams from residuals and spent pulping liquors
- This means traditional tree growing and liberation of fibers while inefficiently burning spent liquors becomes the old technology.
- In its place is forest stewardship and the processing of wood in a way to extract fiber, fuel, chemicals, and power streams that are valued by society and the marketplace.
- The second article in this series will focus on Parts 2 and 3.
- The intent is to evolve current chemical pulp mills into forest bio refineries, preserving infrastructure, jobs, supply chains & permits.

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Figure 7. The Big Change—forest biorefinery technologies will have a disruptive but potentially very positive impact on the pulp and paper industry.

This is a win-win situation for industry, for a university, and for society in general. It demonstrates the true value of synergistic relationships.

Figure 6 describes a major accomplishment in making the technologically advanced workforce a reality. Four community colleges have partnered with universities who have pulp and paper technology to develop curricula for mill operators. PACE was one of the members of the task force. More importantly, partnerships have been developed with local mills who preferentially hire the graduates. The program has recently received a \$5 million grant from the National Science Foundation to expand the activity in pulp and paper mills and to develop a parallel program for building products facilities.

Many of these Agenda 2020 platforms are evolutionarily in nature. Figure 7, which outlines the forest biorefinery platform, can, however, be disruptive. The forest biorefinery platform has the potential to change the model for the forest products industry. Currently it

consists of three parts:

- Sustainable forestry
- Extracting value prior to pulping
- New value streams from spent liquor and other biomass

This technology has the potential to give a ~30 year competitive advantage over current tropical pulp mills.

The second half of this article in October issue of PaperAge will look more closely at the last two parts of the forest biorefinery platform. It will examine how today's existing technologies can (and in many cases will) be modified and adapted for use in new and different ways to achieve the many benefits of forest biorefining. ■

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