

Welcome to the August edition of the FWPA R&D newsletter.

This month our stories feature a new gasification method that converts biomass such as forestry residues into biofuel; research that compares continuous and cyclic drying schedules for processing hardwood timber; a study finding uses for H2F pine off-cuts; and even paper pulp helmets so people can ride bicycles safely.

I hope you enjoy reading about these interesting research projects.

Ric Sinclair
Managing Director, FWPA

MAIN NEWS

FWPA R&D Works webinars 2013: bringing our research to you

FWPA are now running an on-going fortnightly series of webinars highlighting the beneficial outcomes of research projects for those in the wood and timber industry – Wednesday's Webinars.

Research scientists and industry specialists present information about their research 'live' to an audience who watch and listen on a computer in their own office or workplace. At the end of each 45 minute presentation audience members are encouraged to ask questions of the presenter that may help them to consider how the research findings can aid their business. The webinar format provides a time and cost effective means for industry members to receive summaries of recently completed research studies.

Once the webinar is completed a recording of the presentation is put on the FWPA website for those who weren't able to participate at the time, or for future reference. This new platform offers a cost efficient and accessible way of informing industry of up to date research, development and extension activities. Additionally, it also fosters linkages with leading researchers and consultants and enables a forum for discussion.

FWPA will be presenting the following webinars over the next two months:

- Opportunities for using sawmill residues in Australia;
- Utilisation of NIR in forest management; and
- Innovative timber building products.

To be part of the audience, register at the FWPA website <http://www.fwpa.com.au/Webinars>

Completed webinars are available for viewing on the web, and include:

- Forest grower opportunities in the bioenergy sector;
- Bioenergy in Australia status and opportunities;
- Renewed plantation development in Australia;
- Forest productivity optimisation system - a decision support tool; Inter-rotational management in radiata pine;
- Marker-assisted selection in temperate eucalypts;
- Prefabricated timber ground floor systems.

[Register here](#) to receive information on upcoming FWPA Webinars

Using H2 treated pine off-cuts

Disposing of waste H2F-treated pine offcuts is a concern for many frame and truss manufacturers. This research found that 29% of manufacturers who responded to an Australia-wide survey reported a problem with disposal or recycling of H2F offcuts, particularly in NSW, Victoria and WA. The main problem was high costs of disposal compared to untreated waste. As a result fabricators who use H2F timber may be competitively disadvantaged in the market compared to those using untreated.

The researchers also submitted an application to the NSW EPA for use of a small proportion of end-of-life H2F wood in animal bedding and soil conditioner products, which is currently being considered in light of an EPA review of their general exemptions. Previous FWPA sponsored research found minimal risk from a range of wood preservatives in these recycled products where the preservative does not exceed tolerable limits. Based on this research, a wider literature review and sampling and analysis over an eight month period, the application proposes up to 5% of H2F treated wood offcuts in the recycled products inputs.

The research, whilst identifying the associated waste disposal issues, has highlighted a number of opportunities, such as i) potential take-back schemes by suppliers and ii) factoring in end-of-life recyclability, or recovery for energy, when considering preservatives, adhesives and other additives. Recommendations provided within the report are also designed to prevent future issues for timber manufacturers and their customers.

FWPA Project: [Opportunities for post-consumer H2F treated 'blue-pine' off-cuts and resource recovery exemption application for end-of-life wood](#)

FWPA Project Ref: PNA251-1112

Image Credit : TDA (NSW)



FOREST GROWING

Spread of fire in the 21st century

A recent study, 'Global Wildland Fire Season Severity in the 21st Century', indicates that in coming decades conventional approaches to wildfire management may no longer be effective. Researchers from the University of Alberta, University of Toronto and the Canadian Forest Service of Natural Resources have created the first global review that shows the extent of the increasing length of the fire season and the increasing fire weather severity. It gives a 'state of the science' assessment of global fire and climate change and an indication of the strength and trajectory of change in future fire regimes.

Referring to recent disastrous fires in Australia in 2009, Russia in 2010 and Texas and other U.S. states in 2011 as possible precursors of what is coming, the publication reinforces its underlying message that fire management is going to be greatly challenged in the future and new policy/strategy development is needed.

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Big Data lets you see the forest and the trees

The mainstreaming of Big Data analytics is rewriting the rules of forestry management. Tree farmers, plantations and other groups managing forestry assets can dig up relevant insights in a matter of hours using software on desktop computers.

The forestry industry has long used predictive modelling to forecast the environmental impact of planned harvests, controlled burns and other timberland management strategies. Traditionally, however, this sort of analysis has required dozens of individual, custom-developed spreadsheets, access to academic supercomputers and weeks of processing time.

This opportunity is capturing the attention of high-profile companies including Google and Microsoft, both of which are creating cloud-based forestry resources.

Forest analytics software company Remsoft has been developing this technology over the last 20 years. The software has evolved recently to accommodate an increasingly larger number of variables, including the social impact of certain timber management strategies and environmental implications – everything from potential water stress to whether or not a specific plan might affect an endangered species.

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Image Credit: GreenBiz

NASA scientists use satellites to measure plant health

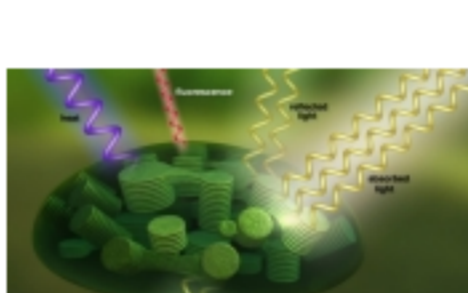
NASA scientists have established a new way to use satellites to measure what's occurring inside plants at a cellular level. During photosynthesis, plants emit what is called fluorescence and NASA scientists have now established a method to turn this satellite data into global maps of the subtle phenomenon in more detail than ever before.

Healthy plants use the energy from sunlight to perform photosynthesis, and re-emit some of that light as a faint but measurable glow. In short, abundant fluorescence indicates active photosynthesis and a well-functioning plant, while low or no fluorescence can mean that the plant is stressed or shutting down. Maps of the phenomenon give scientists a direct look at plant health.

"For the first time, we are able to globally map changes in fluorescence over the course of a single month," Joanna Joiner of NASA's Goddard Space Flight Center said. "This lets us use fluorescence to observe, for example, variation in the length of the growing season."

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Image Credit: NASA



NEW PRODUCT INNOVATIONS

New gasification method can convert lignocellulosic biomass into low cost biofuel

According to the new research results of the VTT Technical Research Centre of Finland, lignocellulosic biomass can be used in the production of high-quality biofuels for the price of less than one euro per litre. A new technology developed in Finland allows the transfer of more than half the energy of wood raw materials to the end-product. The technology is considered ready for the construction of a commercial-scale production plant in Europe.

VTT has assessed the techno-economics of the production of renewable liquid transportation fuels from forest residues. The results show that the production of renewable biofuels from lignocellulosic biomass, mainly bark and forestry residues, could achieve an energy efficiency of 50-67%, depending on the end-product and process conditions. Should the thermal energy produced as a by-product be exploited for district heat or industrial steam, for example, the overall efficiency from biomass to saleable energy products could reach 74-80%.

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Move over 3D printing, self-assembling 4D-printed materials are on the way

Molecular self-assembly, whereby molecules position themselves into defined arrangements, is commonplace in biological systems and nanotechnology. But researchers at the Massachusetts Institute of Technology (MIT) are working on so called '4D printing' technology that aims to bring the process up to the macro scale, enabling 3D-printed materials to be programmed to self-assemble into predefined shapes and structures. Just imagine buying some flat-pack furniture, bringing it home and enjoying a coffee whilst you watch it assemble itself.

Skyler Tibbitts, director of the MIT Self-Assembly lab, was recently named as one of the six Architectural League winners for collaborative research into programmable materials. The 4D printing process (with the 4th dimension being self-assembly over time) involves the use of materials that change their shape in response to movement or environmental factors, such as the presence of water, air, and/or temperature changes.

The technology has the potential to change the face of construction and manufacturing.

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Image Credit: Gizmag

Paper Pulp Helmet aims to solve bike sharing safety conundrum

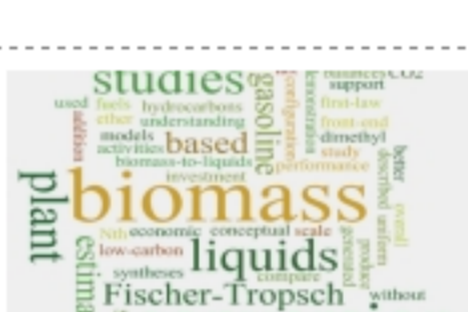
Bike sharing schemes have become a familiar feature in many major cities around the world. The only problem is how to provide and manage the often costly bicycle helmets. The Paper Pulp Helmet offers an ingenious alternative.

The Paper Pulp Helmet has been designed to offer a low cost solution to, where the helmets could be sold for as little as \$1.50 from vending machines. It's the brainchild of Tom Gotteller, Bobby Petersen, and Ed Thomas, all of whom are graduates of the Royal College of Art in London.

The helmets are made from newspapers collected from around the public transport network in London, in other words left on buses and trains. The newspapers are mixed with water to create a pulp, to which an organic additive is then added to make the helmets water resistant for six hours, and a natural pigment added to differentiate the different sizes. The mixture is then vacuum-formed into shape, heated, and then left to dry out.

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Image Credit: Gizmag



TIMBER CONSTRUCTION AND DESIGN

World's first carbon negative building block unveiled

British masonry producer Lignacite has unveiled what it claims is the world's first 'carbon-negative building block'. The company says its new Carbon Buster block, developed in partnership with Carbon8 Aggregates, is the first ever building block that captures more carbon dioxide than it generates during the manufacturing process, at around 14kg of CO2 per ton. The block is comprised of over 50% recycled aggregate, combined with carbon aggregates created using the thermal residue produced by industry.

On the back of research carried out at the University of Greenwich's School of Science, Carbon8 Aggregates identified an end use for thermal residues from waste to energy plants. Once carbonated, the thermal residue is mixed with binders and fillers before undergoing pelletisation. The pellets are subsequently used as one of the key ingredients in the Carbon Buster block. The use of other recycled waste materials, including glass, shells and wood shavings, further minimise the product's carbon footprint.

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Image Credit: Design Build Source

Prefabricated timber walls anchored with glued-in rod connections

A new beam and post system for multi-storey timber buildings has been developed in Sweden. The building is braced with timber walls constructed from two Kerfo-Q LVL boards glued and screwed onto a glulam frame. The walls are fabricated off-site and can be connected to the foundation using either glued-in steel rods with metric thread or nail plates.

Introductory racking tests of full scale walls anchored with glued-in threaded rods were performed.

This paper from the Lulea University of Technology presents the results of the experiments and discusses the use of the transformed section method to predict racking capacity of the anchored wall. To evaluate the strength of the glued-in rods, a newly proposed model was employed. An analytical study was conducted to investigate the role of the sheathing and the contribution of the axial force on the racking capacity of the walls.

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WOOD HARVESTING, TRANSPORT AND LOGISTICS

Monitoring the chipping & transportation of wood fuels

Controlling and organising the complex forest-to-consumer supply chain of wood fuels is a challenging task, especially for the chipping and transport processes. Truck-mounted chippers and transport trailer-trucks must be scheduled to minimise delay to be profitable. Job management within the supply chain, including machine activity based controlling, offers a new way to increase efficiency and productivity.

This study monitored the forest fuel supply processes, specifically regarding time and fuel consumption, for over a 14-month period. Vehicle data, including GPS data, were logged at an interval of one minute. Data management was conducted in a pre-configured database that contained pre-defined reports and were run by the Institute of Forest Engineering, Vienna.

A transport model was developed and applied based on the recorded data. Based on the distance and the processes needed for one cycle, it is possible to estimate and show the effect of moisture content on the productivity and cost of wood chips.

[Click here for source](#)

Image Credit: University of Natural Resources and Life Sciences, Vienna



WOOD PROCESSING AND MANUFACTURING

Bending reinforcement of timber beams

This study from the Technical University of Madrid tested the bending of pine timber beams reinforced with composite materials. Fibres used for the execution of the reinforcement are basalt and carbon. Basalt fibre composites are applied in different grammages, whereas with carbon composites, unidirectional and bidirectional fabrics are used.

The behaviour of the beams was analysed regarding the reinforcement variables applied, and the results are compared with those of the tested beams without reinforcement. The good behaviour of fibre reinforce plastic (FRP) with basalt fiber when applied to timber beams, and that of bidirectional carbon fabrics as opposed to the unidirectional ones.

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Image Credit: Technical University of Madrid



OTHER INFORMATION

Steerable paper planes and maple seeds the basis for life-saving, disposable UAVs

The term 'UAV' generally leads us to think about expensive, high-tech military drones like General Atomics' Predator, but a Robotics team led by Dr. Paul Pounds at Australia's University of Queensland has created a pair of UAVs that are so cheap and easy to manufacture that they'll literally be disposable, single use items. One's basically a high-tech paper plane, while the other follows the form factor of a maple seed with both designed to help save lives in the event of a forest fire.

The two mini-drones are conceived as self-deploying sensor modules for relaying back environmental conditions in difficult terrain. You could drop dozens of them across a forested area, for example, and have them report back on atmospheric conditions that could indicate the start or movements of a bushfire.

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Image Credit: Gizmag

