

Innovative Natural Resource Solutions, LLC
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Bio-fuel cont. from pg. 2

conversion of wood into its constituent components. Long the goal of wood science researchers, successful fractionation rests upon reductions in degradation and cross contamination. Fractionation has the potential to produce an enormous array of fuels and chemicals from wood, once commercially developed.

While significant technical, economic and market challenges exist for each of these technologies, it is becoming clear that bio-fuels and bio-products will play a role in the forest economy of the future. Recognizing this, INRS interviewed leaders in the development of wood-based bio-fuels, and outlined twelve steps that Maine can undertake to support the emergence of this emerging market.

Maine already supports the development of this industry through work conducted at the University of Maine and through the Maine Technology Institute. It can do more by helping developers understand the resource base (wood) and serving as a matchmaker between projects and appropriate locations. By linking with other states in the region, Maine can also seek to influence federal support – both financial and policy – for the wood-based bio-fuels industry, providing additional resources and opportunity to efforts to commercialize forest-based bio-fuels.

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Solutions...

A periodic newsletter for clients and friends of Innovative Natural Resource Solutions, LLC



Houghton joins INRS

In March of 2006, David Houghton joined Innovative Natural Resource Solutions LLC (INRS). Houghton is no stranger to the INRS staff. He had previous connections on various land conservation projects in New Hampshire, Maine and Vermont, and finding money for the NH Land Community Heritage Investment Program (LCHIP).



Stellar Land Conservation Career

Houghton's background is as a wildlife biologist with the U.S. Fish and Wildlife Service as a Refuge Manager at northeastern Wildlife Refuges. In 1994, he joined the Trust for Public Land, working as its director for land conservation in Northern New England. There he had the opportunity to help expand Refuges at Rachel Carson, Lake Umbagog, Conte, and Missisquoi. He also worked closely with the U.S. Forest Service to add key in-holdings in the Green and White Mountain National Forests.

Houghton ended his work with TPL with two landscape signature projects,

At Innovative Natural Resource Solutions LLC, we derive great pride from the diversity of projects we are fortunate enough to work on. This year has been no different, and with the addition of David Houghton to our firm (see story), we have further diversified into timberland investing and large-scale land conservation initiatives, all over the world.

A sampling of our projects in 2006 includes (more in article →):

- Continued work for many private and public clients on renewable energy issues;
- Massachusetts Technology Collaborative research project on the Mass. biomass infrastructure (all of 2007);
- ISO 14001 and forest certification auditing;
- Continued work to secure land conservation funding
- Contract staffing the North East State Foresters Association, including the Northern Forest Partnership Program;
- Facilitating a strategic planning session for the NH Trial Lawyers Association;
- Providing two key presentations at the Northern Forest Biomass Energy Initiative: Working Session Conference.

The list goes on. Thanks to all of our clients and associations.

Charles A. Levesque, President

Cont. pg. 3

Wood-Based Bio-Fuels: A Long Emerging Market...

Since we crawled out of a cave to hunt dinner, humans have looked to the forest as a source of energy. First it was for fires for cooking and space heat; often today it is for production of electricity and process steam. Tomorrow it might be ethanol in the gas tank and other fuels that displace oil in our energy economy.



INRS VP
Eric Kingsley

For at least a century, researchers have been working to find ways to convert wood into a range of products that we currently derive from oil. **While not (yet) commercially successful**, researchers at universities and government laboratories across the country and around the world have been making significant technical progress on the development of “bio-fuels” and “bio-products”.

Today, as the U.S. takes a long, hard look at energy security, climate change and local economic development, there is suddenly incentive to move these technologies out of the lab and onto the factory floor. Venture capital firms, investment banks, Fortune 500 companies and governments worldwide are funding efforts to create liquid fuels and other high-value products (generally replacing oil) from wood.

Recognizing the enormous opportunity and challenges this brings, the Maine Department of Economic & Community Development hired INRS to conduct an initial review the emerging technologies that seek to create bio-fuels and bio-products from wood, and recommend steps that can be undertaken to support this emerging industry. This report, *Wood-Based Bio-Fuels and Bio-Products: A Maine Status Report*, was completed in

June 2006 and is available at www.inrsllc.com.

Currently, there are four technology “families” that researchers and investors are pursuing to convert wood into bio-fuels; a number of companies are active in each of these technologies:

Fermentation is the long understood process of converting plant sugars into alcohols (e.g., ethanol). Wood is a difficult feedstock for this process, due to its hardened cell structure. Some researchers are working on processes that would integrate well with existing pulp mills, either extracting sugar from chips prior to pulping or by using mill sludge after pulping.

Gasification is the rapid heating of biomass in a reduced oxygen environment, producing a synthetic natural gas (“syn-gas”), a mix of hydrogen and carbon monoxide. If clean enough, this syn-gas can be used for a variety of applications, including electricity generation, production of mixed alcohols, or to make substitutes for propane and diesel fuel. To date, the cleanliness of syn-gas from biomass has been a major hurdle to full development of this technology.

Pyrolysis is a close relative to gasification, and biomass is rapidly heated in an oxygen-free environment to produce a liquid “bio-oil”. This can be used in place of oil in some applications (e.g., heating), can be used in electricity generation, and can serve as a platform intermediate for the production of higher value fuels and chemicals. Some operating wood-based pyrolysis facilities currently operate in North America, but challenges regarding process economics and infrastructure to use this product have hampered efforts to fully develop the technology

Fractionation refers to

Houghton cont. from pg. 1

one in Maine with Plum Creek to conserve 64 miles of shoreline around Moosehead and Flagstaff Lakes, and the second with International Paper in New Hampshire, conserving 171,426 acres at the Connecticut Lake Headwaters, working with the State of New Hampshire, the Forest Service Forest



Legacy Program and the Lyme Timber Company.

After his work with TPL, Houghton spent two years as the President of the Audubon Society of New Hampshire where he worked to expand Pondicherry Refuge, and also led the building of two green nature centers, while lobbied for \$41 million in conservation funding for New Hampshire.

Many accomplishments this year

This year with INRS, Houghton’s work has focused on wildlife management, land management, and land conservation. He has been working in Tennessee and Kentucky with the Lyme Timber Company and the Nature Conservancy to develop a large Cumberland Mountain landscape land conservation project and first rate timber investment. Working with The Conservation Fund, Houghton is working on a half dozen smaller pro-

jects in Northern New Hampshire and Vermont, all important to wildlife and agriculture. He is also working with a joint venture of groups called the Friends of Conte Refuge working to help conserve the water and wildlife of the Connecticut River, and with the Wildlife Management Institute to protect and enhance important grasslands in the Northeast.

Working with the National Wildlife Refuge Association on a large project known as “Beyond the Boundaries”, Houghton is helping to create large landscape conservation areas with important National Wildlife Refuges at the core. This work is focused in the Chesapeake, Everglades, Lower Mississippi, Nebraska Sand hills, Northern Plains, Yellowstone to Glacier, and the Klamath Lake area of California and Oregon.

Houghton’s geographic reach goes further – all the way to Africa. Internationally, he is working with the Harvard based, Great Ape World Heritage Species Project assisting with great ape population mapping and conservation. Two large projects, one in the Democratic Republic of the Congo, assessing the population of endangered bonobos, and one in Malaysia, trying to protect one million hectares of the most critical orangutan habitat in the world, which is also important to Sumatran rhino and pygmy elephants, are at focus.

David Houghton is available to work with public and private clients in all areas of land conservation, wildlife habitat protection and wildlife management issues. Combining land conservation and timberland investments has become one of his specialties. Call David Houghton at 603-831-0920 or e-mail him at houghton@inrsllc.com.