

Business

TECHNOLOGY

SPY LAW: Why are feds changing tune on online snooping legislation, asks Michael Geist. **E3**

LAW SUITS: Companies that cause global warming risk getting sued in future, experts say. **E4**

E SECTION » TORONTO STAR « MONDAY, OCTOBER 30, 2006 ★ thestar.com

Report sounds alarm bells on global warming

Inaction may lead to serious economic crisis, U.K. says
But benefits of a determined effort would outweigh costs

LONDON—Ignoring climate change could lead to economic upheaval on the scale of the 1930s Depression, underlining the need for urgent action to combat global warming, a British report on the costs of climate change said.

The report by chief British government economist Nicholas Stern, a 27-page summary of which was obtained by Reuters, says the benefits of determined worldwide steps to tackle climate change would greatly out-

weigh the costs.

The 700-page report, to be published today, said that no matter what we do now, the chance "is already almost out of reach" to keep greenhouse gases at a level scientists say should avoid the worst effects of climate change.

It said the world does not have to choose between tackling climate change and economic growth, contradicting U.S. President George W. Bush who pulled out of the Kyoto Protocol

against global warming in part because he said it would cost jobs.

"The evidence gathered by the review leads to a simple conclusion: the benefits of strong, early action considerably outweigh the costs," said the report, prepared for British Prime Minister Tony Blair and finance minister Gordon Brown.

"Our actions over the coming few decades could create risks of major disruption to economic and social activity, later in this

century and in the next, on a scale similar to those associated with the great wars and the economic depression of the first half of the 20th century," it said.

It precedes U.N. climate talks, starting in Nairobi on Nov. 6, focusing on finding a successor to Kyoto, which ends in 2012.

Blair is pushing for a post-Kyoto framework that would include the United States — the world's biggest producer of greenhouse gases that cause climate change — as well as major developing countries such as China and India.

Kyoto obliges 35 rich nations to cut emissions of greenhouse

gases — which come mainly from burning fossil fuels in power plants, factories and cars — by some 5 per cent from 1990 levels by 2008-12. Many Kyoto nations are above target.

Stern said that, based on current trends, average global temperatures will rise by 2 to 3 degrees centigrade within the next 50 years or so, compared with temperatures in 1750-1850.

If emissions continue to grow, the earth could warm by several more degrees, with severe consequences that would hit poor countries most, the former World Bank chief economist said.

Melting glaciers would initially increase flood risk and then reduce water supplies, eventually threatening one-sixth of the world's population, mainly in the Indian sub-continent, parts of China and the South American Andes, he said.

Declining crop yields, especially in Africa, could leave hundreds of millions unable to produce or buy enough food, he said. Rising sea levels could result in tens to hundreds of millions more people flooded each year.

The report estimates stabiliz-

► Please see **Warming, E4**

Turning forest slash into cash

Hewers of wood, Canadians are also learning to turn lumbering's leftovers into something almost like gold — fuel oil. Golden, and green to boot



trees that are removed during logging. The standard industry practice is to burn slash at the side of logging roads. It's estimated that about 15 per cent of wood resulting from logging activities is biomass from forest slash, though in Ontario the issue is still being studied.

Ramsay asked his staff to hunt around for technologies that could put slash to better use. A government team visited Sweden, Finland and Germany and came to realize there was potential to convert biomass into usable energy, and at the same time create new revenue for the struggling forest sector.

Last summer, the ministry decided to invest \$771,000 to construct a prototype biorefinery that's capable of converting slash into a carbon-neutral "bio oil."

Bio oil is a "green" fuel that contains no sulphur dioxide and half the nitrogen oxide of conventional oil. But just like conventional fuel oil, bio oil can be used in industrial boilers, diesel generators and in turbines that generate electricity.

"There's a lot of residual biomass out there to sustain us," says Peter Fransham, founder and president of Ottawa-based Advanced Biorefinery Inc., which was hired to build the government prototype based on a "dry distillation" process called pyrolysis. Pyrolysis, as an approach, is well under-

Forest fire season had passed, so the plumes of smoke rising from the dense forest below caught David Ramsay's eye.

It was fall 2004, and Ramsay, Ontario's minister of natural resources, was flying in a small plane over an area of northern Ontario. Curious about the smoke, he asked his pilot to fly in for a closer look.

What he saw was indeed fire, though nothing like the wildfires currently ravaging southern California.

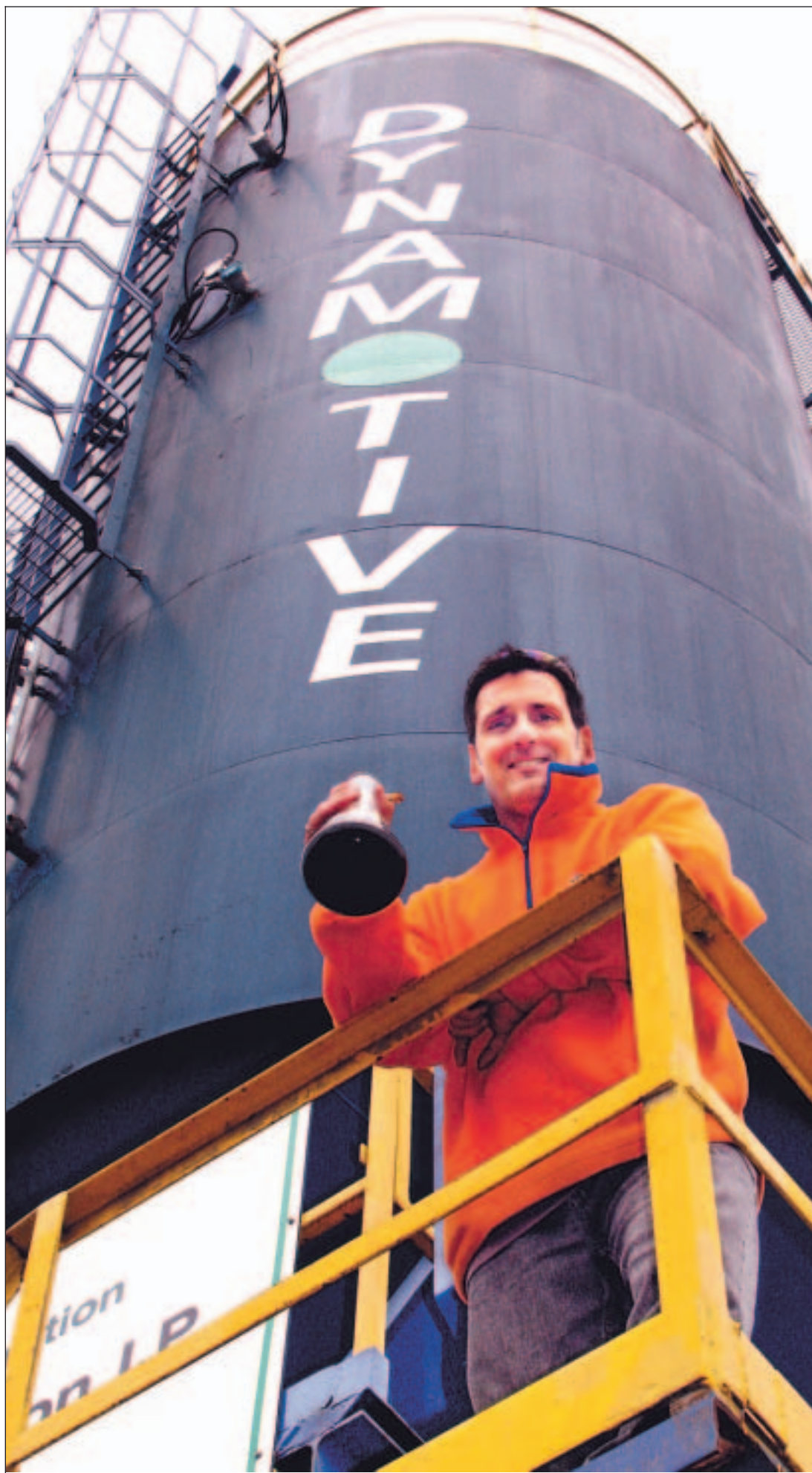
"It was a normal operation in which the forest industry, in cooperation with the ministry, burns the tops of trees," recalls Larry Skinkle, biomass co-ordinator for the forests section of the ministry. "It was roadside slash being disposed of."

Slash is the unwanted branches, stumps, tops and leaves of

'The industrial fuels market is quite staggering, but it's also a market that doesn't accept change very readily. There's a lot of skepticism that needs to be broken down'

Andrew Kingston, CEO of DynaMotive Energy Systems Corp.

► Please see **Bio oil, E5**



Plant manager Hernan de Luca holds out a flask of fuel oil produced from wood waste at a pilot facility behind him, operated by DynaMotive Energy Systems in West Lorne, Ont., southwest of St. Thomas.

NIGEL HORSLEY PHOTO

Dodge letter rebuked CMHC

Rift over lending policies exposed

Two sides met to iron out problem

OTTAWA—A just released letter from the governor of the Bank of Canada to the Canada Mortgage and Housing Corp. exposes a rift between the two over lending policies.

"I read with interest and dismay your press release of June 28 which indicated that CMHC would offer mortgage insurance for interest-only loans and for amortizations of up to 35 years," says the two-page letter from David Dodge to Karen Kinsley, president and CEO of the housing corporation.

"Particularly disturbing to me is the rationale you gave that 'these innovative solutions will allow more Canadians to buy homes and to do so sooner'."

The corporation's actions are likely to drive up house prices and make homes less, not more, affordable, Dodge says in the blunt missive, uncharacteristic of the usually tempered language of the central bank.

"I would have thought that as a Crown corporation, you would feel a responsibility to consult with the Bank of Canada and the Department of Finance before taking actions which could make the macro management of the economy more difficult and which have implications for overall financial stability."

The June 30 letter was obtained by Canadian Press under the Access to Information Act.

A few weeks later, Dodge and Kinsley met privately to sort things out.

"We were reassured by the fact that CMHC's interest-only mortgage product includes no change in mortgage qualification criteria and as such would not be of significant concern to the bank," Dodge spokesperson Jeremy Harrison was quoted as saying.

CANADIAN PRESS

From forest slash to fuel oil

How a portable plant turns logging waste into a greener form of energy

4. The hot air and steam are separated using machinery that creates a cyclone effect. Centrifugal forces and friction cause the biomass to drop to the bottom of the cyclones where the dry material is removed with a conveyor and dropped into the reactor.

5. The reactor is a fancy word for a hot, air-free chamber where the biomass is rapidly heated and the vapours are quickly driven off. At this point there are two products — hot vapours and charcoal.

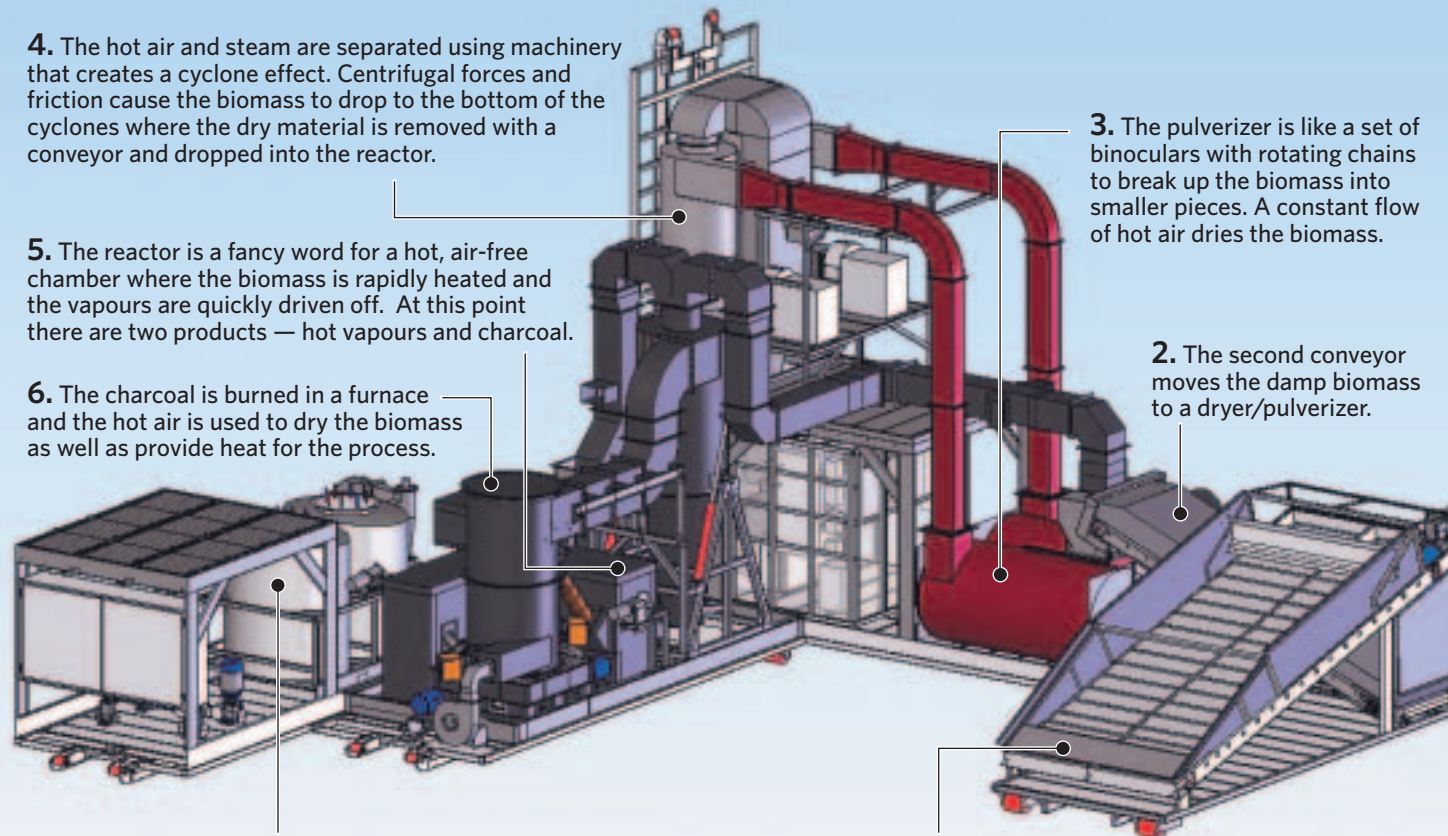
6. The charcoal is burned in a furnace and the hot air is used to dry the biomass as well as provide heat for the process.

7. The hot vapours are cooled and most of the vapours form liquid called bio-oil. The small amount of remaining gas is cleaned and used to generate electricity for the plant.

3. The pulverizer is like a set of binoculars with rotating chains to break up the biomass into smaller pieces. A constant flow of hot air dries the biomass.

2. The second conveyor moves the damp biomass to a dryer/pulverizer.

1. Trucks drop the roughly-ground forest waste into an inclined hopper. The hopper chains drag the biomass up the incline



SOURCE: Adam Valenta/Advanced BioRefinery Inc.

TORONTO STAR GRAPHIC

stood and used. It works by rapidly heating biomass to an extreme temperature — up to 1,000 degrees F — in an oxygen-starved chamber. Under such intense heat, the molecular structure of the biomass shatters, resulting in three usable materials: oil, charcoal and gas. Essentially, what happens over millions of years with fossil fuels happens in a matter of seconds with pyrolysis.

In a biorefinery, the gases and charcoal can be recycled as fuel for powering the system and for pre-drying the biomass. The oil — representing about 60 per cent of the mix — is separated out and can be shipped off as fuel oil or used as a source of chemicals for making everything from plastics to foods to fertilizer.

The challenge when using forest slash as a raw material, however, is that it's a low-density material typically located in remote areas. Bringing it to a central processing facility isn't economical, as the transportation costs wipe out any profit.

"It doesn't take long before the cost of trucking exceeds the value of the biomass," says Fransham, who decided to take a different approach to the problem. "We take the machine to the biomass."

Advanced Biorefinery has designed a transportable plant with six 20-foot-long modules that are easy to transport and

can be assembled on-site within a week. By converting slash into a liquid seven times denser, transportation becomes economical.

"When logging is done in an area and loggers take their equipment to a new site, we go with it," says Fransham, an engineer and scientist who has been developing the technology for 18 years.

"You can view the biomass as an oil well on the surface, but to keep the transportation costs down you have to densify it as you go."

A Dorchester, Ont.-based venture called Agri-Therm Ltd., recently spun out of the University of Western Ontario, is taking a similar approach.

However, its mobile pyrolysis plant is targeted at farmers who want to turn agricultural residue into bio oil.

Queen's University professor David Layzell, research director with the biomass research think-tank BIOCAP Canada, says emerging competition in the field is just what the industry needs to drive innovation and greater interest in bio oil.

"We have to start thinking of bio oil as a major biofuel," says Layzell, pointing out that bio oil's potential as an industrial fuel tends to be overshadowed by sexier renewable transportation fuels such as ethanol and biodiesel.

He says that as the United States moves more aggressively to wean itself from foreign crude oil, there will be a significant role for bio oil and Canadian know-how that has matured after three decades of university research. "Within this whole area of pyrolysis Canada is probably a world leader."

Fransham figures his bio oil became competitive in 1999 when crude oil was an inflation-adjusted \$20 (U.S.) per barrel, making it more affordable to produce than its bitumen cousin from the Alberta oil sands.

"That's pretty much our break-even price in today's dollars," he says. "We will have to discount the bio oil because it is not easy to store and burn, but our market studies indicate that people will buy biofuels at a 30 per cent discount to the market."

Shouldn't be a problem. A barrel of crude oil is trading at around \$60 these days, but approached \$80 back in July.

The high prices led to announcements of record profits last week from some of world's top oil producers, and economists say prices will likely rise back up over the next year.

Fransham envisions a day when thousands of his machines are deployed across the province, churning out enough of the green fuel every day to heat or supply electricity to the equivalent of 2 million homes. The technology would also be

suitable for heavily forested areas of the United States, China, India and other parts of Canada, where remote communities could harvest slash for local fuel production and local use.

But you don't have to go into the bush to make a business out of bio oil, says Andrew Kingston, president and chief operating officer of Vancouver-based DynaMotive Energy Systems Corp.

DynaMotive prefers to build larger, permanent fast-pyrolysis facilities that are strategically located beside a feedstock (raw material) source. For example, the firm's pilot plant in West Lorne, Ont., is located on the site of Erie Flooring & Wood Products, which each day can produce during normal operations about 100 tonnes of sawdust and wood chips.

The West Lorne facility and Erie Flooring have a symbiotic relationship. Erie supplies the residual biomass that is converted into bio oil, charcoal and gas using DynaMotive's process. The bio oil is then used to fuel a Magellan Aerospace gas turbine, which produces heat and 2.5 megawatts of electricity, some of it used for Erie's wood flooring plant. Any remaining electricity is sold into the provincial grid under contract.

vincial grid under contract.

DynaMotive's goal is to travel the world looking for similar, mutually beneficial partnerships — for instance, with a company in Australia that handles municipal green waste or a sugar producer in Brazil with a constant output of sugarcane bagasse (pulpy residue left after extracting sugar). Cleaning up forests in British Columbia that

have been devastated by the pine beetle represents another opportunity down the road, if the economics are right.

"We're almost scavengers," says Kingston, pointing out DynaMotive has tested more than 120 raw materials — from coconut shells to tealeaves.

"We look at the leftovers and see what we can process. In some instances it works, and in others it doesn't. It all depends on volume, the logistics of moving the material, processing it, and what you eventually do with the fuel."

A 200-tonne per day pyrolysis plant is currently under construction in Guelph that will convert wood-based construction demolition material into bio oil and use it to generate electricity.

A number of other plants are planned for Ontario, which through the province's new standard-offer program will pay 11 cents per kilowatt-hour for electricity produced from biomass.

As with Advanced Biorefinery, DynaMotive had early financial support through Sustainable Development Technology Canada, as well as the now discontinued Technology Partnerships Canada. That financing was crucial to demonstrating that the technology works and that the bio oil itself could compete with conventional oil.

The road to acceptance has been slow, but momentum is finally building. "The industrial fuels market is quite staggering, but it's also a market that doesn't accept change very readily. There's a lot of skepticism that needs to be broken down," Kingston explains. "It's moving solidly in the right di-

rection now, and interest begets more interest."

It helps that aluminum maker Alcoa Canada, after testing DynaMotive's bio oil in a furnace at a smelting plant in Baie-Comeau, Que., was satisfied enough to enter contract negotiations for more supply. "We're getting a lot of acceptance by very significant industrial users," says Kingston.

Layzell thinks big when he thinks bio oil.

If enough demand builds for the green crude, and enough large biorefineries emerge to produce it, then it's conceivable that a pipeline infrastructure could one day emerge to support it — similar to what we have today for natural gas and conventional oil.

"When we're looking at bioenergy becoming a significant portion of Canada's energy needs, we need to start thinking scale," he says.

But it's still early days, says Fransham.

"We're kind of where the oil industry was back in the early 1900s . . . It's only really in the last five years that the stars have aligned, with high energy prices and concern about the environment."