



Asphalt Bitumen from Renewable Resources

By Sandra Lawson

(Melbourne - July 5) - An Australian research and development company has developed what it claims is a world first, commercially viable, non-petroleum-based, asphalt bitumen substitute for roads. It is made from the waste material derived in refining sugar cane, molasses.

GEO320 bitumen, as it is known, is the development of Ecopave Australia, a Melbourne-based family-owned organization with a long asphalt manufacturing background.

The company said it had taken more than 20 years and extensive testing to develop the road-grade bitumen substitute which performs and has the benefits of normal stone mastic asphalt but is applied by roller compaction with half the binder content of mastic. "This mastic roller hybrid (MRH) is more economical to lay and is much more skid resistant".

"GEO320 is designed to be a stand-alone replacement for the current road-grade bitumen with added performance benefits," said Mr Eerik Owerhall, owner-partner of Ecopave Australia. "Normal asphalt bitumen has numerous shortcomings which we have all experienced when driving on our roads. GEO320 was designed to correct all these and be a post-petroleum natural alternative.

"Road safety and the environment were the main reasons when designing GEO320. The fact that we can make GEO320 out of Sugar and waste materials like molasses, which comes from a renewable resource, will help to prevent global climate change due to green house gas emissions and also help in recycling", Eerik said.

GEO320 based asphalt will also contribute positively to the so-called "heat island effect" which is a phenomenon that describes urban and suburban temperatures that are (1- 6°C) hotter than nearby rural areas. These elevated temperatures can impact communities by increasing peak energy demand, air conditioning costs, air pollution levels and heat-related illness and mortality.

"This year the asphalt industry celebrates 100 years since the invention of roller-compacted asphalt, the same asphalt you see on the roads today", Mr Owerhall said.

"To date there has been no alternative to bitumen which is probably one of the last remaining products that has not yet seen major progress in terms of its source and characteristics. The arrival of GEO320 is timely because the world is heavily engaged in the push towards non-petroleum based products and environmentally sustainable production".

"What is really surprising to see is that the scientific community around the world has failed to address, pursue and support any alternatives to petroleum based bitumen, almost believing that it will be around forever. Ironically, it took the issue of global climate change to make the wake up call," Mr Owerhall said.

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Ecopave Australia GEO320 Technology Improves Shell Bitumen

By Damien Johnson

(Melbourne - December 21, 2005) – Environmental issues feature increasingly in today's social and commercial world as less harmful and better ways are sought to manufacture and use a wide variety of products. This is why GEO320 is such an important invention, not only is it the first commercial development of a binder for the manufacture of asphalt that is made from non-petroleum based renewable resources eg sugar and molasses but it also possesses increased mechanical and rheological properties to that of normal road grade residue.

Ecopave Australia developed the GEO320 MRH (Mastic Roller Hybrid) bitumen technology already back in the nineties to address some of the residue bitumen's non fit for purpose problems such as fuming, low durability, fuel resistance and slipperiness on the road. GEO320 was originally designed to be a hydrocarbon based bitumen replacement that was safer to use with higher durability, solvent resistance and with increased structural road performance.

The increasing global environmental awareness and demand for safer non-toxic products was a key factor in Ecopave choosing to completely replace the traditional hydrocarbon bitumen model in 1997 with non-petroleum based ingredients made from renewable resources such as Sugar and Molasses.

Ecopave Australia performed a highly successful GEO320 "clean hydrocarbon" bitumen field trial in 2000 with Boral's keen participation, the prototype field trial was designed to be a precursor for the up-coming sugar and molasses product and would establish pavement durability, strength and mix design specifications.

The Royal Dutch Shell lodged an international patent application twelve months after the Boral field trial in 2002 titled "Pigmentable Binder Composition" PCT/EP03/00585 and the claimed raw material ingredients in the application are remarkably identical to GEO320 bitumen, the list of claims admits to not having performed any field trial testing of the binder and says that "the above are data provided under laboratory conditions" only.

GEO320 MRH Asphalt Bitumen has gone through vigorous testing since 1987 and presented here are the latest findings made by ARRB on 16 August 2002. GEO320 MRH was tested by ARRB Transport Research to compare its performance properties with normal road grade residue bitumen, in this case the (Shell Class 320). Standard tests used to characterize bitumen to Australian Standard AS2008 were applied to both products. 1) "GEO320 was less soluble in standard laboratory solvents, the reduced solubility is noted to be advantageous to the end-user" 2) "The GEO320 durability is significantly better than typical class 320 bitumen.

Normal residue bitumen requires hot storage to remain in a viscous suspension until the time of asphalt mixing process. GEO320 MRH bitumen on the other hand is stored in a dry granulated form which is added to the hot aggregate mix at the time of asphalt manufacturing, this not only eliminates wastage (oxidized) bitumen and fuming but saves on fuel costs. The environment and the health of asphalt workers in the road construction industry was a high priority consideration in the twenty years that it took to research and develop GEO320 asphalt bitumen in Australia.

The emergence of ethanol and bio-diesel as alternative fuel sources has only answered half of the road to non-oil dependence and for the society to be totally free from the oil monopoly and be self-sufficient and non co-dependent on fossil fuels, it therefore has to be able to produce an economical environmentally friendly method of constructing roads to support infrastructure, bitumen made from renewable resources such as GEO320 is the newly found missing link.

Ecopave Australia was established in 2002 to commercialize the GEO320 MRH asphalt bitumen technology, their mission is to research and develop asphalt and bitumen alternatives that are made from non-petroleum based renewable resources and by doing so supporting the industries that endeavor to help our planet by engaging in sustainable production and environmentally sound practices. The Developing countries with vast natural resources of sugar beet and cane will be the biggest beneficiaries of the GEO320 bitumen technology since they will be able to boost their economies as well as construct their roads from a bitumen made from local renewable resources. Ecopave Australia is also seeking financial participation from non-profit organizations willing to assist in the manufacture and export of GEO320 bitumen with the view to fighting hunger and poverty around the world.

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Paving towards the future

By Vivien Cuttle

(Melbourne – November 3, 2005) - An Australian invention could see recycled waste producing an environmentally friendly form of bitumen which would have wide-ranging benefits for our environment, health and local industry.

Ecopave Australia has invented a bitumen substitute called GEO320 which is made from plant waste and recycled materials instead of crude oil.

GEO320 inventor Erik Owerhall said he came from a family of asphalt-layers, and had seen his grandfather and great-grandfather die as a direct result of ingesting poisonous fumes from bitumen.

Both ancestors were non-smokers, but contracted lung disease at an early age, prompting Mr Owerhall's search to find a harmless form of bitumen that could also benefit society.

Mr Owerhall said GEO320 was economical to make and cost the same amount as "normal" petroleum-based bitumen.

"We can manufacture GEO320 from molasses (sugar waste) and all sorts of tree resins and waste materials like coconut and palm oil waste and the VTB Bottoms derived in the process of cleaning used motor oils," Mr Owerhall said.

"And we've designed it to incorporate recycled plastics, to help the recycling industries in Australia and around the world."

Petrochemical (oil-based) bitumen has caused concern in scientific and environmental groups because the United States Geological Survey suggested world crude oil supplies would diminish out of existence by 2100.

In contrast, GEO320 is manufactured from renewable resources, earning the approval of Australia's Environmental Protection Agency (EPA), which commends projects that are "ecologically sustainable".

Mr Owerhall said GEO320 also benefited the natural and built environment because it did not contribute to the 'urban heat island effect', which is caused by bitumen absorbing heat from the sun.

"Roads are black, and that's not a good thing for the heat island effect but because GEO320 isn't black, but light brown, it's not absorbing so much infra-red or heat," Mr Owerhall said.

The United States EPA estimated the heat island effect from roads and pavements could raise the temperature of urban areas by up to 6°C, adding to smog and ozone which affects plant growth and people's breathing.

With more than 34,000km of roads owned by the Queensland Department of Main Roads alone, black bitumen could be significantly raising the temperature of the state.

As well as absorbing heat, petrochemical bitumen needs to be manufactured, stored and laid at high temperatures, creating a greenhouse effect and damaging the health of road workers.

The extreme heat can burn the bitumen-layers, and the high temperature causes the bitumen to release poisonous fumes.

Research by the European Bitumen Association showed workers who were consistently exposed to bitumen fumes exhibited serious respiratory problems which could contribute to lung cancer.

But GEO320 is made in granulated form, can be stored at ambient temperatures, and laid at much lower temperatures than petrochemical bitumens.

“GEO320 has fumes but they’re not bad for you,” Mr Owerhall said. “It emits water vapour, which isn’t bad for you, and it’s close to zero per cent volatile content so it’s very safe.”

The GEO320 proto-type was tested by ARRB Transport Research to compare its performance properties with normal road bitumen, and the results showed GEO320 was equally , durable, and resistant to fatigue.

The Queensland Department of State Development recently expressed interest in the product, not only for its environmental benefits but also because it could support local industry.

Queensland produces 95 per cent of Australia’s sugar cane, so Canegrowers Queensland was interested in GEO320 because it can be manufactured from molasses.

Canegrowers Queensland senior policy manager Bernard Milford said the new form of bitumen had the potential to generate another source of income for the struggling sugar industry.

“Molasses is normally quite a low-value by-product of manufacturing sugar, and to have some extra demand for it like this is very encouraging,” Mr Milford said.

“It’s very encouraging to know that the waste material that’s being produced from a sugar mill could be used in such an environmentally friendly and interesting product.”



Petroleum-based black bitumen covers more than 34,000km of Queensland's roads, causing increased greenhouse temperatures and potential health risks for road workers.



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Lighter-coloured GEO320 bitumen has lower heat-trapping capacity and poses no hazards for road workers or the environment.

Article written by Vivien Cuttle

Ecopave photo © Ecopave Australia. View more photos at:

http://www.owerhall.bigpondhosting.com/ecopave_australia_news_geo320_asphalt_bitumen_006.htm

Ecopave Australia

<http://www.ecopave.com.au>

Australian Environmental Protection Agency (EPA)

<http://www.epa.qld.gov.au>

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Molasses road will head north

BY KIRSTY HOSS

A POINT Cook research and design company look set to move their business to Queensland after failed attempts to find capital for what could be a world-first innovation.

Ecopave Australia claim to have developed a world-first commercially viable non-petroleum based asphalt bitumen made from molasses, a waste material derived from refined sugar cane.

However, since the formulation was completed two years ago, the small company have been unable to break into the oil-dominated industry and get the environmentally-friendly product GEO320 out on the roads.

That was until the offer from a Queensland Department of State Development that is interested in the technology as part of an effort to regulate the sugar cane industry.

Though not confirmed at this stage, this has been the most promising news the company has heard for a long time.

"But we would prefer to stay in Victoria, this is our home," said Ecopave director, Erik Owerhall.

Mr Owerhall, his step-brother Jorma Peltonen, and mother Wendy Peltonen came to Australia in 1971 from Finland and started their own research and design company 11 years later.

Having worked in bitumen manufacturing in Finland, the trio set out to replicate the product in Australia, but had to adjust the formula due to the warmer climate in Australia.

"We had to develop new technology here because the mastic, which is 10 per cent bitumen, melts in excessive heat ... Australia has always had to use roller asphalt," said Mr Owerhall.

"This product totally replaces petroleum bitumen. It's a breakthrough."

Despite hopes to remain in Victoria, Mr Owerhall said the company has spent the last two years up against brick walls trying to find capital.

Mr Owerhall said Ecopave applied for new technology business grants through the government and have put the bitumen through rigorous testing with Vicroads and other large companies to verify the quality of the product through core sample testing.

Despite such efforts Mr Owerhall says the reason the company hasn't been able to rustle any interest in Victoria is because of a conflict of interest.

He says his innovative product has been forced out of the marketplace by major oil companies and politics.

Mr Owerhall said road safety and the environment were the main reasons they designed GEO320.

"Roads made from a renewable resource will not only help prevent global climate change due to green house gas emissions but it will be a huge economic benefit to Australia," said Mr Owerhall.

"This year the asphalt industry celebrates 100 years since the invention



of the roller-compacted asphalt, the same asphalt used on the roads today.

"Ironically, GEO320 comes at a time when the world is heavily engaged in the push towards non-

petroleum based products and environmental sustainability," he said.

Australian Road and Research Board (ARRB) chief research scientist Dr John Oliver said it could be a world-first.

Dr Oliver said one must distinguish between the oil industry picking on a small player and a good product.

He said it was possible to break into the industry on a smaller scale, with two New South Wales companies having made the transition.

World first ... Erik Owerhall with his examples of non-petroleum based asphalt bitumen created from sugar cane molasses.

Picture: ARLENE SACHON.



Ecopave Australia

GEO320 MRH Asphalt Bitumen

Asphalt Bitumen from Renewable Resources

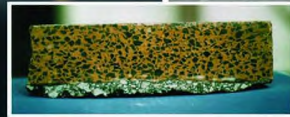
Ecopave is the first commercial development of a binder for the manufacture of asphalt that is made from renewable resources, such as Sugar and Molasses and it also possesses increased mechanical and rheological properties to that of normal road grade bitumen.

GEO320 MRH Asphalt Bitumen

- Durable, long-life paving material
- Made from Natural Sources
- Australian Technology
- Supports Tropical Agriculture



Good roads are fundamental for sustainable development



Ecopave has superior engineering qualities



EcoPave GEO 320 being applied

Current Situation

Whether horse and cart, moped, car or truck, efficient transportation requires an efficient paved surface. Typically, paved surfaces are manufactured from synthetic bitumen. While this paving material may be the norm, it is not necessarily the most sustainable alternative paving material.

A Problem: Synthetic Paving

Roads are typically made from synthetic bitumen, a non-renewable petroleum hydrocarbon. Road-making is recognised as an environmentally damaging process and can create serious air and water pollution problems. Furthermore, petroleum bitumen is finite resource linked to the oil industry that is dependent on energy intensive manufacturing process. There are also significant occupational health and safety considerations associated with the use of bitumen.



Bitumen made from plants not petroleum

A Solution: Ecopave Natural Paving

Australian based Ecopave has developed a proprietary technology to convert a variety of materials into a natural substitute for bitumen, called GEO 320. Of particular interest is the potential to convert molasses derived from the tropical 'renewable resource' sugar cane industry into a natural bitumen material which has ideal mechanical properties and a significantly reduced environmental and social footprint compared to petroleum bitumen.

GEO320 bitumen

is non toxic and comes in a dry granulated form, requires no hot storage, has high durability, high resistance to fatigue, wear, cracking and solvents, low volatile emissions and fuming. The asphalt surface is non slip, with low heat absorption characteristics, has light reflecting surface features in colored form, is fully pigmentable. Furthermore, the coloring system which Ecopave has developed is highly resistant to wear and fading.



Improve road workers health and environmental protection

Ecopave has already undertaken field testing of their product and are moving towards commercial production. SEA O2 are assisting Ecopave to source finance for the further development of the technology. For more information, ask SEA O2 for the Ecopave non-disclosure agreement and access to the Executive summary and other documentation.

<http://www.ecopave.com.au>

Ecopave showcase Poster for the United Nations Environment Program (UNEP) conference held in Dubai February 2006