

## SHELL LOOKS INTO THE HIGHWAYS OF THE FUTURE

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Shell Bitumen fast-forwards thirty years to 2050 to envision the future of the world's highways.



Global trends suggest that the world will continue to see continued population growth and rapid urbanisation, which as a consequence will see increased traffic volumes on road infrastructure. At the same time, new, stricter emissions regulations will be implemented and new technologies will be more commonplace to power the world's vehicles. What kind of innovations can we see on the world's roads and highways to help meet these challenges?

Professor John Read, General Manager for Bitumen Technology at Shell, said: "We are continually pushing the boundaries of bitumen. Today, from our global R&D centre in Bangalore, we have scientists working at a molecular level to make bitumen have the properties necessary to make more durable, sustainable and energy-efficient roads."

"Our investments in R&D are set to transform the humble highway into smart surfaces of the future. Some of these innovations will take a decade or more to come to the market, but others are already on-stream. Take Shell Bitufresh, which removes smell from bitumen, rather than simply masking it. This is done by chemically converting the mercaptans, the smell generating compounds within the bitumen, by attaching really heavy molecules from the Bitufresh to the mercaptans, making them

incredibly heavy and dense, so that they sink to the bottom of the bitumen, preventing their release,” said Read.

John and his team of experts have been developing new technologies that can transform the world’s roads into surfaces that glow in the dark, charge electric vehicles while you drive and prevent harmful emissions from polluting the air.

## Smart surfaces of the future

**Lighting up highways:** Shell Bitumen has started to explore the technical feasibility of changing the visual appearance (phosphorescence) of road pavement surfaces in order to provide ambient lighting, alert traffic to changes of road driving conditions or even danger. It has partnered with suppliers of phosphorescent products and several universities to investigate the feasibility of scaling up phosphorescent asphalt mixtures.

**Generating electricity from our roads:** Shell is working with Pavegen, a technology company that has developed paving slabs to convert energy from people. It is also possible that it could be used to generate electricity to feed the grid.

Shell is also conceptualising how this technology could act as a means to inform local authorities and their contractors that a road is failing: as the road deforms, the pressure exerted by the vehicle would give out a higher electrical current which could then be converted into an indication of damage.

**Improving air quality:** Another development that will be within reach is a road surface that can take harmful substances like nitrogen dioxide or particulate matter out of the air. It is working on bitumen technology that can absorb PM101 particulates like smoke, soot, dust, other materials generated by gases emitted from motor vehicles.

1 Particulate matter 10 (PM10) is a major component of air pollution that threatens both our health and our environment. (PM10) pollution consists of very small liquid and solid particles floating in the air. Of greatest concern to public health are the particles small enough to be inhaled into the deepest parts of the lung. These particles are less than 10 microns in diameter - about 1/7th the thickness of the a human hair - and are known as PM10. (California Environmental Protection Agency Air Resources Board)

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## Notes to Editors

- Shell is a leader in bitumen technology, and recently published the “Shell Bitumen Handbook, Sixth Edition”, which covers the latest topics in bitumen technology and application.
- Shell Bitumen operates a network of Regional Technical Centres located in key regions (Beijing, China; Strasbourg, France; and Bangkok, Thailand.) Shell has also established its global bitumen R&D Centre in Bangalore, India.
- Shell supplies a wide range of high quality bitumen products, from standard-grade bitumen to special polymer-modified bitumen (PMB), which are marketed under the brand name Shell

Cariphalte. Shell Cariphalte has been used in a number of iconic projects for applications such as highways, urban roads and porous asphalts for urban drainage systems. It is ideal for use in heavily trafficked locations such as airfields, racetracks and bus lanes. It can be particularly beneficial in heavy duty applications such as rail, ports, bridge decks, crack relief systems or overlaying concrete pavements and expansion joints.

- Shell is the world's largest international bitumen marketer, and delivers enough bitumen to pave a one-lane kilometre road every four minutes.
- Shell Bitumen's solutions have also been used on a number of Formula One racetracks: Sakhir (Bahrain), Marina Bay Street Circuit (Singapore), Hockenheim (Germany) and Yas Marina (Abu Dhabi) and Sepang (Malaysia). Shell has also recently paved the Bugatti Circuit in LeMans, France.

## **Royal Dutch Shell plc**

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