India finds cheap energy may be an easy nut to crack

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New Delhi: When police bring the traffic to an abrupt halt in Raipur, capital of the remote Indian state of Chhattisgarh, drivers know what to expect next. Soon, flashing red lights atop speeding government vehicles come into view. Raman Singh, Chhattisgarh's chief minister, is passing through.

Government motorcades are a common sight in Indian capitals. But what is different about this one is that all of Chhattisgarh's official vehicles, including the chief minister's Tata Safari jeep, are run on oil from the wrinkled black nut of a shrub-like tree called jatropha.

Unlike biofuels made from crops such as soybeans and maize, jatropha (below) is inedible, grows on non-arable land and needs little water or care. "It has good potential, no doubt about it," says Suhas Wani, principal scientist at the International Crops Research Institute for the Semi-Arid Tropics, near Hyderabad.

Chhattisgarh is well positioned to become the country's biodiesel hub. It's fleet of 40 or so jatropha-powered cars reflects the state's push to develop alternative energy sources that also include solar, wind, small hydroelectric, biomass and industrial waste.

India, which imports more than 70 per cent of its oil and gas, is trying to launch one of the world's biggest jatropha biofuel projects in order to bolster energy security. The country's Ministry of Rural Development has proposed spending $375 million (£186 million, ¤245 million) over five years to plant 1.2 million acres of jatropha across India and research the crop's viability as a biofuel. If the experiment is successful, the government would aim for 30 million acres of jatropha plantations and seek to commercialise cultivation.

If 10 per cent of India's estimated 60 million hectares (148 million acres) of non-arable land is cultivated for jatropha or other biofuels, the country could produce 4-5 million tonnes of biodiesel a year, or about 10 per cent of current diesel demand, says Winrock, an Indian non-governmental organisation.

Chhattisgarh, carved out of the poor neighbouring state of Madhya Pradesh in 2000, hopes to generate 1,000 Mw, or a third of the state's existing generating capacity, from alternative energy sources by next year. The state has planted 160,000 hectares of jatropha. Further planting could by 2012 yield an annual 2m tonnes of biodiesel. Shailendra Shukla, director of Chhattisgarh Renewable Energy Development Authority, says that with the non-arable land available, "if all other states replicate this, it will change the economy".

Such confidence in jatropha, still untested on a large scale, may be unwise in a country notorious for ambitious plans and poor implementation. Energy, however, is one of the most pressing issues for India: on the back of annual economic growth of nearly 9 per cent, energy consumption is expected to double between 2005 and 2030, according to the International Energy Agency. India paid up to $60 billion to import crude oil last year. "The whole economy of India is damaged because of crude oil," says Shukla, when asked what spurred him to look at jatropha in 2004, when he made an initial test batch of 100 litres. "If we are increasing consumption of oil, we are benefiting Arab people, not the Indian economy."

Other countries such as South Africa, Ghana, Brazil and Madagascar have jatropha projects. But commercialisation is still unproven and questions remain about large-scale cultivation and distribution. The potential of jatropha and similar plants is alluring, however. As well as growing on wasteland and requiring little cultivation, it is renewable and is produced locally. It is also far less polluting than fossil fuels, creates jobs in poor and remote areas and can be used by India's enormous rural population to run farm machinery and even generate electricity.

"It's far easier to grow jatropha than drill for oil," says Akshat Rathee of Earth 100 Biofuels, a New Delhi-based consultancy.

Alternative energy dovetails with the government's aims to develop rural areas – including electrifying villages – to narrow a widening divide between rural and urban India.

To show the possibilities for jatropha, Winrock in 2005 launched a pilot project in the village of Ranidhera, four hours' drive from Raipur. Ranidhera sits beneath high-tension electrical wire strung on pylons. But the power coursing over the village is carried to cities while Ranidhera, like so many Indian villages, descends into darkness as dusk falls.

With $100,000 of funding from the British High Commission and the Indian government, Winrock supplied four generators powered on jatropha oil, along with machines to crush seeds and filter the raw oil. Some 25,000 jatropha saplings were planted on roadsides. Today all 110 homes in Ranidhera have electricity for four hours each evening. Speaking from her low-roofed home, Pholbati Bai says her four children can now study at night. Villagers pay about $1 a month for two lights – comparable with the cost of a month's supply of kerosene.

The project in Chhattisgarh has been far more ambitious. The state and central government set aside an annual budget of about $20 million to employ rural dwellers to plant jatropha on government-owned land, alongside rail lines and on bunds, the strips of land that separate farmers' fields. Shukla persuaded the state to build a $85,000 plant to produce 1,000 litres of biodiesel a day.

Other efforts to cultivate non-edible, rain-fed biofuel plants on fallow land are starting to take off across India. The northern states of Uttarakhand and even desert-like Rajasthan are planting jatropha saplings, while Andhra Pradesh and Karnataka in the south are planting pongamia, a tree similar to jatropha.

With its large number of poor, India is reluctant to use food crops for fuel. Oil from inedible plants is less controversial than soybeans, maize or palm biofuel crops as it does not divert arable land – a trend that has contributed to a jump in global food prices. "In India, we can't afford to even think of using those," says Shukla of biofuel made from food. "If you're growing soya for biodiesel, you're wasting your time, money and land."

He points out that jatropha produces three times more oil per hectare than soybeans. Shrubs mature within a few years, produce seeds for about five decades and require little more than pruning. About 4kg of jatropha nuts yield a litre of oil.

To dispel doubts, Shukla offered to fill the chief minister's car with the yellow liquid. He says Singh, the chief minister, told him: "You can pour it into my car, but if anything goes wrong I'll hang you."

Three years later, Singh insists on running his car only on the home-made biofuel.