

## India Zero Emissions Transportation Program (IZET)

**Location:** Delhi, Agra, and Pune

**Type:** Design, test, assemble, and demonstrate electric vehicles

**Size:** 1,000 electric three-wheelers

**Funding:** Total: US\$9,360,000

Private: US\$5,460,000

Public: US\$3,900,000

**Objective:** To reduce health impacts from vehicular emissions.

**Duration:** 1999–2003

**Scale:** Urban

### Summary

Under the IZET Program, seven three-wheelers are being field-tested in the city of Agra for one year. With the initial success of the prototype three-wheeler demonstration phase, Bajaj Auto Limited (BAL) of India and New Generation Motors (NGM) of the United States (US) have signed a Memorandum of Agreement (MOA) to enter into a joint venture to produce 1,000 electric three-wheelers in India. Soon the people of India, and perhaps those throughout the region, will have options for replacing pollutant-emitting conventional vehicles with zero-emission vehicles.

### In-Country Principles That Attracted Nondonor Financing

- Capacity building and informed decision making
- Public participation in, and support of, sustainable development

Partners in the IZET Program recognized that a sustainable economy requires a market-based approach. In pursuit



of this strategy, the program collaborated and cost-shared with US and host-country private sectors to leverage resources and encourage private-sector participation.

Sound principles that have helped instill commercial standards and attract private financing included the formation of a management team independent of the government, and hiring and developing staff with appropriate skills matched to the job. Educational workshops for decision makers, stakeholder partnerships and exchanges, dissemination of best practices, and participation in international forums and workshops have enabled informed decision making. Such activities have also increased the awareness, knowledge, and skills of sector professionals in such technical areas as commercial business practices and management of private-sector involvement.

Increased public support for sustainable development has been enhanced through programs in public education and communication; implementation of state-of-the-art systems for collecting, demonstrating, and exchanging information; and innovations in the use of education, communication, outreach strategies, methods, and tools. Papers were presented and prototype vehicles were displayed for show-and-ride at various transport-related seminars to emphasize the importance of zero-emission vehicles in mitigating tailpipe emissions and improving human health.

The federal and state governments have issued a series of stringent directives and regulations against conventional vehicles and encouraged alternative transport options in urban areas.

### Financing

Total project investment from all sources is roughly US\$9,360,000, which covers activities through prototype testing and some redesign. Estimated private financing contributions include US\$3,900,000 from NGM, US\$1,500,000 from BAL, \$30,000 from Sheraton, and \$30,000 from Pizza Hut. The United States Agency for International Development (USAID) contributed US\$3,900,000.

NGM has secured US\$700,000 in funding from the Industrial Credit and Investment Corporation of India (ICICI), a leading private equity investor in India, to analyze vehicle design to improve production techniques for commercial production of the first 200 electric three-wheelers.

Initial USAID funds were leveraged 1:1.3, and, should full-scale production ensue as expected, the private-sector funding will dwarf USAID's funds.

## The Project

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Indian urban centers are among the most polluted in the world, resulting in respiratory disease and the expenditure of billions of dollars a year. Emissions from two- and three-wheeler two-stroke vehicles are the major source of urban air pollution. The IZET Program seeks to replace pollutant-emitting conventional two-stroke engines in two- and three-wheeler vehicles with electric motors. Electric vehicles have zero tailpipe emissions, thus reducing the impact on human health.

IZET is collaborating with motivated private firms that have the technological, financial, and commercial resources to move electric-vehicle technology from demonstration to commercialization. BAL has entered into a MOA with NGM to produce 1,000 state-of-the-art electric two- and three-wheelers in India. Each partner to the agreement has agreed to produce 200 electric three-wheelers by early 2003. BAL and NGM are also considering a similar MOA for production of electric two-wheelers.

## Technical Data

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The key technologies used are direct current brushless electric motors and microcontrollers. The equipment is designed to meet Indian driving and environmental conditions. Range, for example, is well within the majority of consumers' needs, and the vehicles can operate without degradation during the rainy season.

## Performance Data

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The IZET Program serves two cities. On the basis of the projected penetration scenario, electric vehicles are expected to reduce significant amounts of vehicular pollutant emissions, including greenhouse gases.

## Participants and Roles

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BAL screened electric-drive systems for the Indian marketplace, which led to NGM of the US becoming a technology provider. BAL has also provided substantial resources in design, testing, certification, operation, maintenance, oversight of data acquisition, and product evaluation of electric vehicles. NGM provides state-of-the-art motors and controllers for electric vehicles and cost-shares their design and production activities in the program. Welcomgroup's Mughal Sheraton Hotel in Agra uses prototype electric three-wheelers to transport guests to local attractions. Tricon Restaurants



International (Pizza Hut) in New Delhi will use electric two-wheelers as part of its normal operations. USAID identified various partners in India and in the US to increase interest in electric-vehicle technology. With nominal financing, USAID brokered partnerships with organizations in the host country while maintaining the overall schedule and providing technical assistance to partners.

## Partner Contacts

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