Electric Vehicle India

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Sreehari B. Nambiar, O&N India
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Executive Summary

**Market**
- Electric vehicle (EV) market in India is at a nascent stage and is expected to grow by 45% over 2008-09 and 2009-10
- Comprises of electric cars, three wheelers and electric two-wheelers
- Electric two-wheelers dominate the market with 97.5% of the EV market

**Drivers:**
- Increasing crude oil prices
- Low maintenance cost
- Increasing demand for green cars in foreign market
- Manufacturers providing incentives to attract consumers

**Challenges:**
- EVs to move from concept to daily use
- High price
- Lack of supply of spare parts
- Government Initiatives
- Charging infrastructure
- Lack of optimum business models

**Drivers & Challenges**
- Growing number of market participants are entering the market
- Automobile firms are launching EV version of conventional car models
- Increase in number of joint ventures, mergers and acquisitions
- EV players are seeking carbon credits

**Trends**
- Most of the players operate in the electric two-wheeler segment only one company operates in the electric car segment

**Competition**

<table>
<thead>
<tr>
<th>Major Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reva Electric Car Company</td>
</tr>
<tr>
<td>Electrotherm Motor Ltd.</td>
</tr>
</tbody>
</table>

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India Scenario

- At the moment demand for EV in India is quite small
- By industry estimates, less than 5% of the passenger car market in India would comprise of electric cars over the next 5-7 years; at 1,75,000 units
- Apart from Reva EV, Toyota has launched Prius hybrid. These are the only two EV/HEV cars commercially sold in India
- Reva, Indian electric car manufacturer, sells most of its cars in the European market
- Honda Siel Cars India had to withdraw the Civic hybrid from the Indian market within months of its launch in 2008
- Nissan is not planning to launch Electric Vehicles in India presently
- Indica electric from Tata Motors, is expected to debut in Norway, Denmark and the UK towards the end of 2011

Source: India Today "Green auto cos seek tax relief for growth leap", Feb 2010
**Government Initiative**

- **Governance Council**
  - Government will set up the Governing Council for Electric Vehicles
  - Operate under the Ministry of Heavy Industries and Public Enterprises
  - It will develop infrastructure for electric mobility - charging stations
  - Council to have representatives from various Ministries – includes Road Transport and Highways, New and Renewable Energy and Power and also industry representatives
  - Promote Joint Ventures, esp. in EV battery manufacturing & technology transfers

- **Excise Duty**
  - In the Union Budget 2010-11, the Government of India reduced the excise duty on electric vehicles from 8% to 4%.
  - Components for EV is under 10%, which the manufacturers are asking for a waiver

- **Concessional Duty**
  - Import of EVs attracts 14% and import of parts attract 4% duty
  - Lithium ion batteries attracts 18%

- **State Initiatives**
  - Delhi, Rajasthan, Uttarakhand and Lakshadweep don’t levy VAT;
  - Chandigarh, Madhya Pradesh, Kerala, Gujarat & West Bengal offer partial subsidy on VAT;
  - Other states charge 4%-15% VAT
  - Delhi Government provides the highest incentives for electric vehicles with tax rebates amounting to 29.5% of the cost, (15% subsidy on the base price of the Reva, along with 12.5% VAT exemption, and road tax and registration charge refund)
  - Air Ambience fund would support the cost of such subsidies (fund created out of environment cess of 25paise per litre of diesel sold in the state of Delhi)

Mahindra Reva

- India based electric car maker Mahindra Reva plans to introduce battery leasing for its customers.
- Battery leasing will reduce the cost of an electric car by about Euro1000 (Rs.60,000).
- Reliance Digital, the consumer durables and information technology division of Reliance Retail, will retail the electric car of Mahindra Reva.

To display Reva cars at its outlets in Hyderabad, New Delhi and National Capital Region near New Delhi.

- Mahindra Reva has introduced a scheme in Bangalore wherein it will allow consumers with petrol-fuelled vehicles to exchange their vehicles for the Reva-i electric car.

Some of the above ideas where announced, but there is no official record of its implementation.

Hero Electric India Pvt Ltd

Hero Electric opened a battery charging station in Delhi and plans to establish 2,000 such stations.

Electrotherm India Ltd

Electrotherm India Ltd., the Ahmedabad based manufacturer of “YOBYKES”, plans to set up battery charging stations in Ahmedabad, Mumbai, Chennai and Bangalore.

Source:
IBID: “Reliance Digital to retail Reva in Hyderabad and NCR”, Jan 2009;
business-standard.com/India: “electrotherm-to-roll-out-battery-charging-stations”
Sfgate.com: “India’s electric car captures imagination”
**EVs – Pros & Cons [India perspective]**

**PROS**
- People who buy EVs are well aware of the features and how to use it.
- They are upscale customers and the EVs are used as a second or third vehicle in the family.
- Second car market is developing among the elite families, and women show a preference to EVs due to easy handling.
- Dealer network is getting developed (post acquisition by Mahindra in the case of Reva).

**CONS**
- Value proposition for EVs as a first car in India is absent, as the price at present is high in comparison to a petrol car.
- Public perception on EVs is that it's an underpowered vehicle at higher cost.
- The comparison done is directly against a high performance petrol car *(which should not be the case)*.
- Efficient batteries usage and Charging know-how to End-Customers is the need of the hour.
- The design of the vehicles are so toyish that one can’t be proud of owning an EV *(perceived thought, current owners seem to be very attached to their EVs)*.
- Lack of spare parts and good skilled technicians for maintenance purpose.
- Very less localization of EV components *(motors controllers and batteries esp. Li-on, are imported from China, Taiwan & USA)*.

"However, unless we get huge government support for R&D on electric vehicles and development of charging stations, it is impossible for us to drive the EV programme in India in the near future, despite Renault Nissan having the largest portfolio of EVs globally," adds Ashish Sinharoy, vice president, Renault India.

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Opinions on EVs

“Basically EVs lack the practicality and luxury that petrol/diesel powered vehicles have been able to offer”

“Most of these cars are yet to be commercially launched here, courtesy the high duty structure that makes them economically unviable, lack of component suppliers for such vehicles and insufficient infrastructure for charging such vehicles”

“Most manufacturers are still struggling to find suppliers for components of these vehicles; consequently, the cost of ownership of such vehicle is very high and therefore not viable from the sheer consumer point of view”

“In spite of India being a hub for inventions of such technologies, EVs have not gained popularity owing to lack of adequate and timely support from central and state governments”

“Although, government has reduced the custom duty on three of the imported components in battery operated vehicles to 10%, still the incentives seem too less for the price reduction of such vehicles”

“Other initiatives, needed to make the EVs affordable, include measures like relaxation in excise duty and VAT uniformity for the key inputs and components and also for the finished electric vehicle”

“In addition, in various countries, electric vehicles receive subsidies so as to promote the technology and reduce emissions. Similar initiatives should be introduced in India”
## Industry Updates

### EV Players who are planning to enter Indian market

<table>
<thead>
<tr>
<th>Players</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Renault**         | • It is planning to enter the electric vehicle segment in India by 2015  
                        • Renault plans to bring cars to India first as completely build units and may later set up local assembly of manufacturing |
| **Pininfarina**     | • Italy-based company is planning to launch an electric car in the Indian market by 2014  
                        • The battery driven car will run for 250 kms in one charge  
| **Bavina Cars India** | • It plans to launch its first electric car in 2011  
                        • It will invest USD 60 mn to build a factory in Tamil Nadu which will be capable of producing 25,000 electric cars p.a. |
| **Mitsubishi Motors** | • It has already launched Mitsubishi Innovative Electric Vehicle (MiEV) in Japan and Hong Kong and plans to launch an electric car in India soon |

Sources: EV Report “Pininfarina bringing electric car to India”, July 2008; Surfinida “Electric Bikes and Scooters in India”, Cleantech.com “Mitsubishi brings next-gen EV mini to market, burnyourfuel.com:”Bavina cars battery prototype car...”
## Industry Updates

### Conventional car makers moving into EV manufacturing

<table>
<thead>
<tr>
<th>Players</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hyundai Motor India Ltd.</strong></td>
<td>It has launched the electric version of its car brand i10 in India</td>
</tr>
</tbody>
</table>
| **General Motors India Ltd.** | It has decided to launch the electric version of its car brand Chevrolet Spark  
It will also launch the electric version of the Chevrolet Volt |
| **Tata Motors Ltd.**           | Tata Indica is going to have its own Electric version, work is in well advanced stage and its initial version is launched in Norway. It uses motor supplied by TM4, a subsidiary of Hydro-Qubec. Initial battery supply is from Korean company Energy Innovation Group (EIG)  
It will also look at launching electric version of Nano. It will be called e-Nano |

Sources: Business Standard: “Indian market for EVs still nascent”  
Auto makers ; While Mahindra & Mahindra (M&M) has taken a lead in...”, June 2010
## Joint Ventures, Mergers and Acquisitions

<table>
<thead>
<tr>
<th>Players</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahindra &amp; Mahindra (M&amp;M)</td>
<td>• M&amp;M Bought a majority stake in Reva Electric Car Company in 2010&lt;br&gt;• Reva Electric Car Company is now called Mahindra REVA Electric Vehicle Co Ltd. wherein M&amp;M owns 55.2% equity in it by a combination of equity purchase from the promoters and a fresh equity infusion of over Euro7.5 mn (INR 450 mn) into the company</td>
</tr>
<tr>
<td>Ford Motor Company</td>
<td>• It has formed a joint venture with Magna International to launch an electric car in India by 2011-2012&lt;br&gt;• It will be a zero-emission lithium-ion battery operated electric vehicle (BEV) which is developed as a sedan</td>
</tr>
<tr>
<td>Hero Electric</td>
<td>• Hero Electric and Electrovaya has formed a partnership for the electrification of two-wheeler vehicles using Electrovaya’s Lithium Ion Super Polymer(R) battery technology</td>
</tr>
<tr>
<td>TATA Motors Ltd.</td>
<td>• Tata and Electrovaya has formed a partnership for the electrification of Tata Indica’s electric version using Electrovaya’s Lithium Ion Super Polymer(R) battery technology</td>
</tr>
<tr>
<td>Tata Motor European Technical Centre (TMETC)</td>
<td>• An UK Subsidiary of Tata Motors, TMETC acquired 50.3% holding in Miljø Grenland/Innovasjon, Norway, which specializes in development of innovative solutions for electric vehicles</td>
</tr>
</tbody>
</table>

**Sources:** Mahindra and Mahindra company website; Tata Motors Website Wheelsunplugged “Ford-Magna electric car to hit India by 2011-12”, Jan 2009, Cleantech.com
<table>
<thead>
<tr>
<th>Players</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tata Motors</strong></td>
<td>They presented to the Delhi Transport Corporation CNG-Electric Hybrid Low-floor Star buses, India’s first such vehicle, being used in public transportation. The four Hybrid buses of Tata Motors will run in the city of Delhi during the Commonwealth Games period. The Hybrid Tata Starbus is powered with a parallel hybrid engine comprising an internal combustion CNG engine and an electric motor using regenerative energy storage system.</td>
</tr>
<tr>
<td><strong>Mahindra &amp; Mahindra (M&amp;M)</strong></td>
<td>M&amp;M Launched “BIJLEE” electric 3-wheeler in 2002, but still its not a commercial success. It faced stiff resistance from Government agencies for getting permission for commercial running. M&amp;M plan to launch the electric version of its commercial vehicle “MAXXIMO” by October 2010. M&amp;M’s acquisition of REVA is helping in refining these vehicles.</td>
</tr>
<tr>
<td><strong>Ashok Leyland</strong></td>
<td>Ashok Leyland unveiled its plug-in CNG Hybrid bus, HYBUS, at Auto Expo, New Delhi. This bus is also supposed to be used for the common wealth games.</td>
</tr>
</tbody>
</table>
## Accessing Carbon credit potential

<table>
<thead>
<tr>
<th>Players</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mahindra Reva</strong></td>
<td>“It is in the process of assessing our carbon credit potential. Its primary objective is not to trade but to understand how much carbon it can save”</td>
</tr>
<tr>
<td><strong>Hero Electric</strong></td>
<td>It has appointed a consultancy to assess its carbon credit potential and to facilitate clean development mechanism (CDM) registration under the United Nation’s Framework Convention on Climate Change</td>
</tr>
<tr>
<td><strong>Kabirdass</strong></td>
<td>It has entered into an agreement for clean development mechanism (CDM) project with Asia Carbon Emission Management India Pvt. Ltd. It anticipates that carbon trading will generate up to 10% of its revenues</td>
</tr>
</tbody>
</table>

Source: Business Line “Electric vehicle makers see revenue potential in carbon credits”, Jul 2009
Case Study – Mahindra Reva

- Started as REVA Electric Car Company, a joint venture between the Maini Group of Bangalore and AEV LLC of California, USA
- First to sell over 3500 electric cars worldwide especially in Europe
- Has accumulated data from more than 100 million KM of user experience
- Supply Chain network includes vendors, who can cater to Reva’s customized small volumes
  - Indian vendors have indigenously developed motors, Lead acid batteries, spare parts & body parts
  - International vendors co-operate for better design, Li-on batteries, motors
- Acquisition by Mahindra gives wider access to vendor network
- Core strength of REVA is the battery management and EV know-how
- Reva spends 7% of its turnover for R&D
Focus Areas for Mahindra Reva

- Core Product Development
- Franchise Model Manufacturing
- IP (Battery Management & EV)
- Mobility Solutions

Into the future
- Starting a new facility, 30,000 cars per annum would be the capacity
- Focus on European markets
- Develop better performing EVs in various platforms
- Reva to utilize the vast distribution & sourcing arrangement of Mahindra and bring down the cost through better sourcing

Opportunities – Mahindra Reva
- Telematics
- Smart Grid & Charging
- Battery Leasing
- Public commuting solutions

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"I wanted to make a difference. I wanted not only to talk about preserving the environment, but to do something concrete about it. I wanted to change the blueprint, to change my mind, to change my habits in order to reduce the carbon footprint of this Embassy. And I bought a REVA and branded it with the Swiss logo. "Charly", as we call it, runs and runs and runs quietly all over the Dublin area. And for such a use its range is perfectly sufficient, as is its speed - if you abide by the law. For longer distances I use my private -hybrid- car. 

Reactions vary from amused to unreservedly positive, but generally people admit that it is a good idea to "go electric". "Can an ambassador represent his country with dignity by using such a tiny and cheap car" I am asked. Yes, I represent Switzerland in Ireland with dignity. Each time I use Charly to travel from A to B I concretely contribute to keep Dublin clean. And people recognize and appreciate this."

Beat Loeliger
Ambassador of Switzerland
Electric Vehicle

• Biggest explosion seems to be in the 2-wheeler market
• Supplies are majorly from China as SKDs, Electric Components come from Taiwan also
• 2-wheeler industry is looking at technology for motor controllers, battery & Charging Systems
• Hybrids might enter Indian market sooner and more easily than e-vehicles because hybrids do not require new refueling infrastructure
• Indian people do not appreciate the concept of vehicle lifecycle costs and how these compare among different alternatives
• The battery technology needs to progress to meet the commuter expectations of range, recharging and affordability, for them to switch over to EVs
• In India most of the EVs run on Lead Acid batteries, Li-on batteries are the need of the hour to improve the EV’s efficiency
• At present the components and Li-on batteries come from China, Taiwan & Japan; Power controllers come from US
• Battery leasing options are being considered by the manufacturer, for reducing ownership costs
• Future technologies for EVs – Diagnostic Monitor System (DMS), Vehicle Information Data Download, Portable Electronic Tools, Climate Control Seats and Energy Management Systems
Analysis

Infrastructure

• While technological issues move closer to better Battery Management solutions, the lack of infrastructure for electric vehicles usage can stunt the growth
• Technology and infrastructure developments should be tuned towards consumers needs and driving habits and not the other way around
• Lack of government support, infrastructure and optimum business models
• Need of public private partnership in the development of EV infrastructure

• Current discussions around climate change are indicative of an ever-increasing receptive business environment for electric vehicles, which are part of the solution to air pollution and climate change
• Policies are needed to maximize environmental benefits of the program and create markets
• Fiscal incentives may support sales, but cannot bring EVs to the mainstream
• Improved technology, roadworthiness, safety features, scale, infrastructure, power sources & lifecycle emissions, recycling of battery and end of life regulations for recyclable materials should be taken care of
The Way Ahead

Manufacturers

Marketing

Supply Chain

Industry Thrust

R & D

• Should move away from assembling of CKDs imported from China (2-Wheelers)
• 4-wheeler manufactures should also look at developing different platforms
• Work as an integrator bringing together utilities
• Provide futuristic solutions like Telematics and Smart Grids

• Vendor to play pivotal role in co-development of EVs
• Immediate attention required in Batteries, Motors, Electric components

• Create awareness along with Business Development Activities
• Multi Channel Promotional activities (Industry Associations, Forums, Social networks, Road shows)
• Create Influence groups - Evangelists
• Develop a good after sales service network

• Lobbying with Government
• Influence Government Purchases
• Promote academic research
• Initiate Pilot programmes

• R&D specific to EV required,
• Develop testing facilities
• These facilities can be shared by the industry or company specific

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Conclusions

- EVs in India is at a very nascent stage and is stated to grow in double digits
- EVs in India is dominated by 2-wheeler segment, and the immediate future also seems to be in this segment
- Supplies for 2-wheelers are majorly from China as SKDs, Electric Components come from Taiwan also
- 2-wheeler industry is looking at technology for motor controllers, battery & Charging Systems
- Only one Indian car manufacturer – Mahindra Reva, it basically describes the total Indian electric car manufacturing
- In India most of the EVs run on Lead Acid batteries, Li-on batteries are the need of the hour to improve the EV’s efficiency
- At present the components and Li-on batteries come from China, Taiwan & Japan; Power controllers come from US
- Hybrids might enter Indian market sooner and more easily than e-vehicles because hybrids do not require new refueling infrastructure
- In terms of infrastructure there is lack of government support, infrastructure and optimum business models
- Need of public private partnership in the development of EV infrastructure
Company : Reva Electric Car Company

Corporate Information

<table>
<thead>
<tr>
<th>Headquarters</th>
<th>Bangalore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded</td>
<td>1994</td>
</tr>
<tr>
<td>Products</td>
<td>Electric cars</td>
</tr>
<tr>
<td>Key People</td>
<td>Chetan Maini – Deputy Chairman</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.revaglobal.com">www.revaglobal.com</a></td>
</tr>
</tbody>
</table>

Business Highlights

- In May 2010, Mahindra & Mahindra bought 55.2% controlling stake in Reva
- In India, REVA aims to have its products present in 50 cities by 2012
- The Company sells its products and conducts test marketing in 24 countries across Europe, Asia and South America. It is looking to begin distribution in 40 to 50 countries by 2012 to establish REVA as a global electric vehicle brand
- It is building a new environment friendly assembly plant in Bangalore with a capacity of 30,000 units per year that is due for completion by end-2010
- Exploring a model of franchise manufacturing to access global markets
Company : Electrotherm India Ltd.

Corporate Information

<table>
<thead>
<tr>
<th>Headquarters</th>
<th>Ahmedabad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded</td>
<td>1983</td>
</tr>
<tr>
<td>Products</td>
<td>Electric two-wheelers, three wheelers</td>
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<tr>
<td>Key People</td>
<td>Mukesh Bhandari – Managing Director</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.electrotherm.com">www.electrotherm.com</a>, <a href="http://yobykes.in/">http://yobykes.in/</a></td>
</tr>
</tbody>
</table>

Business Highlights

- The company is engaged in various business segments apart from electric vehicle business. The electric vehicle business contributed revenues of Euro 7.8mn (INR 468 mn) in 2009.
- It develops and manufactures battery operated scooters under the Yo-bykes name and other battery operated vehicles, including electric 3 wheelers and hybrid electric buses, as well as components of electric vehicles, such as batteries, motors, controllers, and other components for electric vehicles.
- In 2009 it launched new models of Yo-bykes with an upgraded top speed of 50 km per hour.
- In Q1FY10, it produced 2,295 ebikes.
Company : BSA Motors

Corporate Information

<table>
<thead>
<tr>
<th>Headquarters</th>
<th>Chennai</th>
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<tbody>
<tr>
<td>Founded</td>
<td>N.A.</td>
</tr>
<tr>
<td>Products</td>
<td>Electric Two-wheelers</td>
</tr>
<tr>
<td>Key People</td>
<td>Mr. Srinivasan, Vice President</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.bsamotorsindia.com/index.asp">www.bsamotorsindia.com/index.asp</a></td>
</tr>
</tbody>
</table>

Business Highlights

- Two-wheeler division of Tube Investments of India, the flagship company of Murugappa Group which is worth Euro 2.65 bn (INR 159 bn)
- Has production capacity of 100 electric scooters per day.
- Brands include **Edge, Roamer, Street Rider, Diva**
- Over 120 outlets spread across 10 states and 1 union territory
- Company to spend Euro 3.3 mn (INR 200 mn) in R&D activities
Company: Hero Electric

Corporate Information

<table>
<thead>
<tr>
<th>Headquarters</th>
<th>New Delhi</th>
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<tbody>
<tr>
<td>Founded</td>
<td></td>
</tr>
<tr>
<td>Products</td>
<td>Electric Two-wheelers</td>
</tr>
<tr>
<td>Key People</td>
<td>Vijay Munjal – Chairman</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.heroelectric.in/">http://www.heroelectric.in/</a></td>
</tr>
</tbody>
</table>

Business Highlights

- Hero Electric is a 100% subsidiary of Hero Group.
- In the Auto Expo 2010 held in Delhi, it launched three e-bikes namely, **E-Sprint, Optima Plus, Zippy**
- It had already test launched its E-Sprint bike in some cities where it had received positive response
- It aims to open showrooms in all the major cities across India during 2010-11.
- It expects to have over 350 showrooms operational by the end of 2010.
Company : Kabirdass Motor Company Ltd.

Corporate Information

<table>
<thead>
<tr>
<th>Headquarters</th>
<th>Chennai</th>
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<tbody>
<tr>
<td>Founded</td>
<td>2006</td>
</tr>
<tr>
<td>Products</td>
<td>Electric Two-wheelers</td>
</tr>
<tr>
<td>Key People</td>
<td>Murali Kabirdass – Director, Manohar Kabirdass – Director</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.kabirdass.in/">www.kabirdass.in/</a></td>
</tr>
</tbody>
</table>

Business Highlights

- It offers its e-bikes and scooters under the brand XITE.
- The Company has in a span of 21 months successfully sold over 1,800 bikes and scooters.
- Its present installed capacity of electric scooters is 40,500 while it proposes to raise its capacity to 200,000 units.
- The Company has already got an approval from the SEBI regarding its Initial Public Offer (IPO).
  - It plans to come up with the IPO in June-July 2010.
  - The Company intends to raise Euro 11.17 mn (INR 670 mn).
  - It intends to use the proceeds of the issue towards the expansion of its existing facilities and for the manufacturing of spare parts of electric scooters.
Company : EKO Vehicles

Corporate Information

<table>
<thead>
<tr>
<th>Headquarters</th>
<th>Bangalore</th>
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<tbody>
<tr>
<td>Founded</td>
<td>2005</td>
</tr>
<tr>
<td>Products</td>
<td>Electric Two-wheelers</td>
</tr>
<tr>
<td>Key People</td>
<td></td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.ekovehicle.com">www.ekovehicle.com</a></td>
</tr>
</tbody>
</table>

Business Highlights

- Eko Vehicles sells its e-bikes under the brands **Velociti, Cosmic** and its latest launched brand **Strike**
- The Company has sold more than 15,000-20,000 units of its products and has received orders to deliver another 100,000 units in India
- It will undertake a major expansion drive to raise its production capacity to 20,000 units a month
- It will require an investment of Euro 5-8.33mn (INR 300-500 mn)
Company: Ampere Vehicles Pvt. Ltd.

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<tr>
<td>Products</td>
<td>Electric Two-wheelers</td>
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<tr>
<td>Key People</td>
<td>Hemlatha Annamalai – Founder &amp; CEO</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.ampvl.com/">http://www.ampvl.com/</a></td>
</tr>
</tbody>
</table>

Business Highlights

- The Company is a wholly owned subsidiary of Ampere Vehicles Pte. Ltd., Singapore
- Has its factories at Sulur, Coimbatore, Tamil Nadu, India
- With an investment of about Euro 2.5 mn (INR 150 mn), it plans to begin production of e-bikes, three-wheelers and four-wheelers in a new plant
Company : Avon Cycles

Corporate Information

<table>
<thead>
<tr>
<th>Headquarters</th>
<th>Ludhiana, Punjab</th>
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<tbody>
<tr>
<td>Founded</td>
<td>1952 (initially as a bicycle manufacturer)</td>
</tr>
<tr>
<td>Products</td>
<td>E-bike, cycles</td>
</tr>
<tr>
<td>Key People</td>
<td>Sohan Lal Pahwa (Chairman), Onkar Singh Pahwa (MD)</td>
</tr>
<tr>
<td>Website</td>
<td><a href="http://www.avoncycle.com">www.avoncycle.com</a></td>
</tr>
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</table>

Business Highlights

- The company is engaged in the development of a range of e-bikes and e-scooters. Entry level model AVON e-bike is already in the market.
- Its electric bikes and scooters are sold under the names e-bike VX, e-plus, e-lite, e-magic, E-scoot.
Company : Lectrix Motors

Corporate Information

<table>
<thead>
<tr>
<th>Headquarters</th>
<th>New Delhi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Founded</td>
<td>2007</td>
</tr>
<tr>
<td>Products</td>
<td>Electric Two-wheelers</td>
</tr>
</tbody>
</table>
| Key People   | Rakesh Malhotra – Founder & Director  
|              | M.L. Malhotra – Chairman & Director |
| Website      | http://www.lectrix.in/ |

Business Highlights

- It is a part of the SAR Group
- In FY 2008-09, the turnover of the Group was Euro 0.1 bn (INR 6 bn)
- The vehicle is powered with battery charger from Luminous, its group company
<table>
<thead>
<tr>
<th>Products/ Models</th>
<th>Company</th>
<th>Website</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accura Genx, Active+, Yadi</td>
<td>Accura bikes Pvt. Ltd.</td>
<td><a href="http://www.accurabikes.com">www.accurabikes.com</a></td>
<td>Two Wheeler</td>
</tr>
<tr>
<td>Oreva e-bike</td>
<td>Ajanta manufacturing Ltd. (Oreva Group)</td>
<td><a href="http://www.oreva.com/oreva_bike.php">www.oreva.com/oreva_bike.php</a></td>
<td>Two Wheeler</td>
</tr>
<tr>
<td>Amez Lovely, Amez Achiever</td>
<td>Amez Vehicles (SM Gauges Group)</td>
<td><a href="http://www.amez.in/">www.amez.in/</a></td>
<td>Two Wheeler</td>
</tr>
<tr>
<td>Elektra</td>
<td>Cal-On Motors</td>
<td><a href="http://www.cal-onmotors.in/">www.cal-onmotors.in/</a></td>
<td>Two Wheeler</td>
</tr>
<tr>
<td>Doon Electric Scooter</td>
<td>Doon Scooter India</td>
<td><a href="http://www.doonscooter.com">www.doonscooter.com</a></td>
<td>Two Wheeler</td>
</tr>
<tr>
<td>Products/ Models</td>
<td>Company</td>
<td>Website</td>
<td>Category</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>----------------------------------------------</td>
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</tr>
<tr>
<td>Power Pad, Scribbler, Battery Modules, Battery</td>
<td>Electrovaya</td>
<td><a href="http://www.electrovaya.com">www.electrovaya.com</a></td>
<td>Batteries</td>
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<td>management Systems</td>
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<tr>
<td>Inverters, Batteries, UPS, Packaged power, Enterprise</td>
<td>Luminous Power Technologies (P) Ltd.</td>
<td><a href="http://www.luminousindia.com">www.luminousindia.com</a></td>
<td>Batteries</td>
</tr>
<tr>
<td>Solutions</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Motors, Electronics, Switchgear</td>
<td>Kirloskar Electric Company Ltd.</td>
<td><a href="http://www.kirloskar-electric.com">www.kirloskar-electric.com</a></td>
<td>Electric Motors</td>
</tr>
<tr>
<td>HT Motors, LT Motors</td>
<td>Crompton Greaves</td>
<td><a href="http://www.cgglobal.com/">www.cgglobal.com/</a></td>
<td>Electric Motors</td>
</tr>
<tr>
<td>Battery operated DC Motors, speed reducers</td>
<td>Rotomag</td>
<td><a href="http://www.rotomag.com">www.rotomag.com</a></td>
<td>Electric Motors</td>
</tr>
<tr>
<td>EV rapid chargers</td>
<td>NEC Corporation</td>
<td><a href="http://www.nec.com">www.nec.com</a></td>
<td>EV chargers</td>
</tr>
<tr>
<td>Electric vehicle chargers</td>
<td>Axiom Energy Conversion Pvt. Ltd.</td>
<td><a href="http://www.axiomenergy.co.in/">www.axiomenergy.co.in/</a></td>
<td>EV Chargers</td>
</tr>
<tr>
<td>Products/ Models</td>
<td>Company</td>
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<td>Category</td>
</tr>
<tr>
<td>----------------------------------------------</td>
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<td>----------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Processors, Controllers</td>
<td>Freescale Semiconductors</td>
<td><a href="http://www.freescale.com">www.freescale.com</a></td>
<td>Microcontrollers &amp; Processors</td>
</tr>
<tr>
<td>Digital signal processors</td>
<td>Texas Instruments</td>
<td><a href="http://www.ti.com">www.ti.com</a></td>
<td>Microcontrollers &amp; Processors</td>
</tr>
<tr>
<td>Computer aided engineering services</td>
<td>Hinode Technologies</td>
<td><a href="http://www.hinodeindia.com">www.hinodeindia.com</a></td>
<td>System design and development</td>
</tr>
<tr>
<td>Head lights, Tail lamps, blinkers, mirrors</td>
<td>Fiem Industries Ltd.</td>
<td><a href="http://www.fiemindustries.com/">http://www.fiemindustries.com/</a></td>
<td>Automotive Lighting, Mirrors &amp; components</td>
</tr>
</tbody>
</table>
Cars to debut in India

- Tata Nano-Ev
- REVA i
- REVA NXR
- REVA NXG
- REVA NXG PROTOTYPE
- Hyundai i10 Electric
- Chevrolet e-Spark
- Tata Indica Vista Electric