Bicycles is the first industrial product that gets universal in China.

By end of 80s last century, China has 500 million units of bicycles.

It is bicycles that enhances China's speed for the first time.

But...
By 2012, car ownership in China reaches 120 million, with annual growth of 15.1 million;

There are more than 200 million registered drivers, with annual growth of 26.47 million.
By end of May this year, the electric bicycles in China had exceeded 150 million.

In Jiangsu, every 100 households on average has 79.9 units of electric two wheelers, becomes No. 1 of the ownership.
The reduced CO$_2$ emission in one year by riding on an electric bicycle, instead of a motorcycle, equals the amount of CO$_2$ absorbed by 22 trees.
Wasted nighttime electricity reused by 150 million electric bicycles equals the total power generated by 4 Qinshan nuclear power plant in one year.
Electric two wheelers in China

- Introduction
- Market analysis
- Trends
- Issues
- Policy options

Ms FU Jia
Email: fujia316@163.com
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an e-bicycle

an e-scooter

an e-motorcycle
Chinese electric two wheeler brands:
Table 2.2: List of selected electric two wheeler manufacturers and distributors in China

<table>
<thead>
<tr>
<th>Item</th>
<th>Brand</th>
<th>Company</th>
<th>Headquarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>AIMA</td>
<td>AIMA Hi-tech</td>
<td>Tianjin</td>
</tr>
<tr>
<td>2.</td>
<td>AUCMA</td>
<td>Qingdao AUCMA Electric S&amp;T Co., Ltd.</td>
<td>Qingdao, Shandong</td>
</tr>
<tr>
<td>3.</td>
<td>BYVIN</td>
<td>Shandong Bidewen Power Technology Co., Ltd.</td>
<td>Weifang, Shandong</td>
</tr>
<tr>
<td>4.</td>
<td>CRANES</td>
<td>Shanghai CRANES Electric Vehicles Co., Ltd.</td>
<td>Shanghai</td>
</tr>
<tr>
<td>5.</td>
<td>DALUGE</td>
<td>Nanjing Daluge Hi-Tech Stock Co., Ltd.</td>
<td>Nanjing, Jiangsu</td>
</tr>
<tr>
<td>6.</td>
<td>FOREVER</td>
<td>Zhonglu Co., Ltd.</td>
<td>Shanghai</td>
</tr>
<tr>
<td>7.</td>
<td>GEOBY</td>
<td>GEOBY Electric Vehicle Co., Ltd.</td>
<td>Changzhou, Jiangsu</td>
</tr>
<tr>
<td>8.</td>
<td>Giant</td>
<td>Giant (China) Co., Ltd., Giant Electric Vehicle</td>
<td>Kunshan, Jiangsu</td>
</tr>
<tr>
<td>11.</td>
<td>Lvneng</td>
<td>Lvneng Electric Bicycle Technology Development CO., LTD</td>
<td>Changzhou, Jiangsu</td>
</tr>
<tr>
<td>12.</td>
<td>PHOENIX</td>
<td>Shanghai Phoenix E-bicycle Wuxi Co., Ltd.</td>
<td>Wuxi, Jiangsu</td>
</tr>
<tr>
<td>13.</td>
<td>Schwinn, Diamondback, Specialized, Scott, MBK, Repco, Apollo, Hodaka and Deki</td>
<td>Shenzhen China Bicycle Company (Holdings) Limited</td>
<td>Shenzhen</td>
</tr>
<tr>
<td>14.</td>
<td>SUNRA</td>
<td>Jiangsu Xinri E-Vehicle Co., Ltd.</td>
<td>Wuxi, Jiangsu</td>
</tr>
<tr>
<td>15.</td>
<td>Yadea</td>
<td>Jiangsu Yadea Technical Development Co., Ltd.</td>
<td>Wuxi, Jiangsu</td>
</tr>
</tbody>
</table>
Electric two wheelers in China

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Ms FU Jia
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<table>
<thead>
<tr>
<th>Region</th>
<th>Top Speed</th>
<th>Electric Motor Size</th>
<th>Other Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>&lt;20 mph (&lt;32 kph)</td>
<td>Max 750W</td>
<td>Has operating pedals</td>
</tr>
<tr>
<td>Canada</td>
<td>&lt;20 mph (&lt;32 kph)</td>
<td>Max 500W</td>
<td>Vehicle weighs less than 120kg; has operating pedals</td>
</tr>
<tr>
<td>Western Europe</td>
<td>&lt;15.5 mph (&lt;25 kph)</td>
<td>Max 250W</td>
<td>Motor operates during pedaling only (Pedelecs)</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>&lt;15.5 mph (&lt;25 kph)</td>
<td>Max 250W</td>
<td>Has operating pedals; some markets require motors only operate during pedaling</td>
</tr>
<tr>
<td>China</td>
<td>≤12.4 mph (≤20 kph)</td>
<td>No limit</td>
<td>Has operating pedals; 40kg max weight</td>
</tr>
<tr>
<td>Rest of Asia Pacific</td>
<td>≤15.5 mph (≤25 kph)</td>
<td>Max 250W</td>
<td>Has operating pedals</td>
</tr>
<tr>
<td>Latin America</td>
<td>&lt;15.5 mph (&lt;25 kph)</td>
<td>Max 250W</td>
<td>Has operating pedals</td>
</tr>
<tr>
<td>Middle East</td>
<td>≤15.5 mph (≤25 kph)</td>
<td>No limit</td>
<td>Has operating pedals</td>
</tr>
<tr>
<td>Africa</td>
<td>≤15.5 mph (≤25 kph)</td>
<td>No limit</td>
<td>Has operating pedals</td>
</tr>
<tr>
<td>Region</td>
<td>E-scooters</td>
<td>E-motors</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------</td>
<td>--------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Nother America</td>
<td>20 mph (32 kph) &lt; Top speed ≤ 30 mph (48 kph)</td>
<td>Top speed &gt; 30 mph motor size &gt; 3 kw</td>
<td></td>
</tr>
<tr>
<td>Western Europe</td>
<td>15.5 mph (25 kph) &lt; Top speed ≤ 28 mph (45 kph)</td>
<td>Top speed &gt; 28 mph</td>
<td></td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>15.5 mph (25 kph) &lt; Top speed ≤ 28 mph (45 kph)</td>
<td>Top speed &gt; 28 mph</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>12.4 mph (20 kph) &lt; Top speed ≤ 31 mph (50 kph)</td>
<td>Top speed &gt; 31 mph</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 kg (max weight) &lt; Top speed ≤ 31 mph (50 kph)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rest of Asia Pacific</td>
<td>15.5 mph (25 kph) &lt; Top speed ≤ 31 mph (50 kph)</td>
<td>Top speed &gt; 31 mph</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vehicle weight over 40 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle East/Africa</td>
<td>15.5 mph (25 kph) &lt; Top speed</td>
<td>Top speed &gt; 31 mph</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vehicle weight over 50 kg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Electric two wheelers in China

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Statistics - Global:

- In 2012
  Sales: 30 million units
  Revenue: $ 6.9 billion

- In 2018:
  Sales: more than 47 million
  Revenue: $ 11.9 billion

7.5% compound annual growth rate (CAGR)

(Pike Research, 2012)
Approximately every ten Chinese owns an e-bicycle, or an e-scooter, or an e-motorcycle.
Statistics - China:

- **Ownership**: 150 million by now
- In 2012
  - Output: 35 million units
- Export: 875,000, 2.5% in the total output
- **Major export destinations**:
  
  - USD 60.5 m (14.2%)
  - USD 46.2 m (10.85%)
  - USD 41.7 m (9.80%)

Flags of major export destinations:

- Netherlands
- Germany
- United States
- Italy
- Japan
- Belgium
- Brazil
- United Kingdom
- Spain
### General description
- The biggest & most concentrated area for manufacture, distribution & market;
- Fragmented marketplace;
- Low-cost products and batteries, sealed lead acid battery as the mainstream;
- High-cost, high-quality;
- Underperformance
- Mergers and acquisitions;

### Estimate sales in 2012/ global share
- Asia Pacific / China: 28 million / 92%
- West Europe: 782,512
- North America: 105,682

### Anticipated sales in 2018/ global share
- Asia Pacific / China: 42.4 million / 89%
- West Europe: 1.5 million
- North America: 342,526

### Average cost
- Asia Pacific / China: $167
- West Europe: $1,546
- North America: $815

### Lithium ion (Li-ion) battery penetration
- Asia Pacific / China: 4%
- West Europe: 65%
- North America: 56%
Features of China's market:

• Affordability
  Price in China: 1400 ~ 1800 RMB (≈228 ~ 294 USD)
  High end product: 4000 RMB (≈652 USD)
  A li-on battery costs 1000 RMB (≈160 USD) more than a SLA battery
  Pay back within 1 ~ 2 years of purchase;

• Manufacturers & distributors

• Battery technology: from 2012 to 2018
  Global li-on batteries: 6% to 12%
  China: 4% to 10% e-scooters and 15% e-motorcycles
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Market trend

1. Down-slowed growth, and demand for industry transformation

2. Domestic relocation

3. Acceleration of industry consolidation, with market fragmenta

4. Battery materials from SLA to Li-ion
Electric two wheelers in China

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## 1. Ambiguity in regulations:
Contrasting the current & new national standard

<table>
<thead>
<tr>
<th></th>
<th>The current national standard</th>
<th>The new standard</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year of effect</strong></td>
<td>1999</td>
<td>2013 (provisional)</td>
</tr>
<tr>
<td><strong>Top speed</strong></td>
<td>20 kph</td>
<td>26 kph</td>
</tr>
<tr>
<td><strong>Speed limiter</strong></td>
<td>Have but dismountable;</td>
<td>Indismountable speed sensor to cut off the electricity if beyond the limit;</td>
</tr>
<tr>
<td><strong>Sub-categorization</strong></td>
<td>None, top speed ≤ 20 kph, max weight: 40kg</td>
<td>Into three types:Intelligent, pedelec and pure electoric type based on road condition and locations;</td>
</tr>
<tr>
<td><strong>Number of technical terms</strong></td>
<td>34</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Concepts of safety: mechanical safety, electricity safety, and driving safety.</td>
</tr>
</tbody>
</table>
2. Hyper fast & safety issue & health risks
3. Lead poisoning, battery recycling

In Beijing, around 30,000 ~ 50,000 ton SLA batteries to be recycled & processed, but about 80 percent went to illegal channel in 2011.

Lead-acid battery pollution prevention and occupational health protection

By end of July in 2011, about 80 percent of the 1930 registered SLA production, assembling and recycling companies were closed.
<table>
<thead>
<tr>
<th></th>
<th>Merits</th>
<th>Defects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sealed lead acid batteries</td>
<td>Low cost;</td>
<td>Heavy, short durability (approx. 300 cycle times, long charging time (6~8 h), lead poisoning, poor performance in low temperature;</td>
</tr>
<tr>
<td>Lithium batteries</td>
<td>Light, larger capacity, long durability (Lithium iron as much as 2000 cycle times), fast charging (2~3 h), clean in production &amp; use;</td>
<td>Low stability;</td>
</tr>
</tbody>
</table>
4. Charging facilities to be developed

Table 1.4 Charging infrastructure development in China

<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>Shenzhen</td>
<td>BYD built up the first charging stations for electric cars;</td>
</tr>
<tr>
<td>2008</td>
<td>Beijing</td>
<td>Setting up the first domestic centralized charging station for the Olympics, which can provide charging for 50 pure electric buses;</td>
</tr>
<tr>
<td>2009</td>
<td>Shanghai</td>
<td>Shanghai Power Company invested the first commercial charging station in China.</td>
</tr>
<tr>
<td>2009</td>
<td>Beijing</td>
<td>The first demonstration charging station project which has the complete intelligent control system;</td>
</tr>
<tr>
<td>2009</td>
<td>Shenzhen</td>
<td>2 charging stations with 134 charging piles in operation;</td>
</tr>
<tr>
<td>2010</td>
<td>Tangshan</td>
<td>The State Grid sets up its first modelling charging station, which can charge 10 electric cars, in two models: fast charging and slow charging.</td>
</tr>
</tbody>
</table>
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1 More reality-sensible and meaningful regulation;

2 Effective management system;

3 Establishing effective monitor system for battery recycle and disposal;

4 Battery and motor improvement;

5 Electricity supplying infrastructure;

6 Electric two wheelers as public transportation
Electric two wheelers as public transportation

Wuhan: 100 e-bicycles
Chongqing,
Hangzhou,
...

Combination of e-bicycles and public renting system will further amplify the positive environmental effect of electric two wheelers and better solve the traffic congestion and pollution issues.

It is advised that li-ion battery e-bicycles are used in the public renting system, with the renting system jointed invested by local governments, electric two wheeler manufacturers, as well as private companies and individuals.
Paper available in July at UN DSD website