Biweekly 001 July/16

Booming Electric Logistics Vehicle Industry

July 2016

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SMM
Shanghai Metals Market

The following terms are used in this report

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Acronym	Definition
EV	Electric vehicles
3C	Smart phone, personal computer ,tablet, portable power and other electronics
PACK	Battery packaging
BMS	Battery management system
$LiPF_6$	Lithium hexafluorophosphate
LiFSI	Lithium bis (fluorosulfonyl) imide
EC	Ethylene carbonate
PC	Propylene carbonate
VC	Vinylene carbonate
FEC	Fluoroethylene carbonate
LCO	Lithium cobalt oxides
NCM	Lithium nickel cobalt manganese oxide
NCA	Lithium nickel cobalt aluminum oxide
LFP	Lithium iron phosphate
LMO	Lithium manganese oxide
MPV	Multi-purpose vehicles, which generally are hatchbacks and can take 7-8 people

Contents

Hot Topics

Wang Chuanfu: Electric Special Vehicle and Logistics Vehicles Brace for Golden Times

January 29, 2016 Source: 360che.com

Electric special vehicle and logistics vehicles entered golden times, said Wang Chuanfu, President of BYD at a meeting held January 23, 2016, citing the clarification of government subsidy for electric special vehicle and logistics vehicles.

Special vehicle and truck account for 1/3 of total vehicle discharge in cities, but enjoyed no subsidy. Government subsidy put great emphasis on pure electric passenger cars and buses and fuel cell vehicles but little on special vehicle and truck. Because of that, society, experts and the public attention to EV are all focused on passenger cars and buses, rarely involved in special vehicles and trucks.

Global EV market was booming in 2015, and China's EV market grew 3-4 fold. China's EV output and sales surged, including passenger vehicle and special vehicle. The industry benefits from China's government, while overseas industry is pushed by the market resource allocation, said Wang.

Wang Chuanfu speaking at the electric vehicle meeting

China's President Xi emphasized that EV is crucial for the strengthening of China's vehicle industry. Premier Li Keqiang also expressed the importance of accelerating development of EV market. Wang Chuanfu considered the release of the *Guidance Suggestion for EV Development* as a remarkable event in China's EV development.

Source : 360che.com

Relevant News

- **Shanxi Dayun Automobile Manufacturing Receives 2,000 Electric Logistics Vehicle Order**

  Shanxi Dayun Automobile Manufacturing and Zhongjin Yuntong New Energy Technology held signing ceremony for 2,000 Dayun electric vehicles on July 5. Dayun Automobile Manufacturing is the only qualified electric truck producer in Shanxi, and has successfully produced electric logistics vehicles, special vehicles, motor tractor, minibuses and passenger vehicles.

  Source: company news

- **2016 Beijing Auto Show: BYD T3 Electric Logistics Vehicles**

  BYD T3 electric logistics vehicles appeared at the 2016 Beijing Auto Show. The vehicle is electric driven, and has 2 charging interfaces, with 3.3kW AC and 40kW DC charging modes. Fast charging takes 1 hour, and trickle charging takes 6-13 hours. BYD T3 is electric driven, and endurance is no less than 200 km under full loading.

  Source: autohome.com.cn

- **NSU to Acquire Nearly 38.07% Stake in Shaanxi Tongjia Automobile**

  NSU announced it plans to acquire a 38.07% stake in in Shaanxi Tongjia Automobile through stock right transfer and capital increase, so as to develop electric logistics vehicle business. It also plans to acquire a 60% stake in DBK for RMB 569 million, to improve the layout of new energy industry.

  Source: company news

- **Orders Received by Electric Logistics Vehicles Producers In 2016**
  - On January 6, Dongfeng Yangste Automobile signed a 25,000 electric logistics vehicles order with Hubei Dangdai Guosheng
  - In April, Dongfeng Motor signed framework agreement for 6,000 electric logistics vehicles with Zebra Run
  - On May 24,Yangste Automobile signed buying contract for 10,000 multi-use special vehicles with Horwing Holdings
  - On June 2, Nanjing King Long signed a 8,000 electric logistics vehicles order with Beijing Clean Vegetable Alliance
  - On June 3, Victory Auto signed a 6, 300 electric logistics vehicles order with 5 express companies

  Source: ifeng.com

Note:
Electric logistics vehicle industry keeps developing, waiting to booming soon

Elecric Logistics Vehicle Market Analysis

Driving Force Analysis of Market Development

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Supply Side

Price Disadvantage Resolving

- Buying electric logistics vehicles **enjoys national and local subsidy**, which offsets price disadvantage compared to fuel oil vehicles
- Electric logistics vehicles also enjoy many incentives, such as **preferential tax for purchase and benefits on license plate or parking charge**

Pushing of Supporting Facility

- The *Development Guidance for Electric Vehicle Charging Facility 2015-2020* stipulates that over 4.80 million distributed chargers will be newly constructed by 2020 to meet demand from 5 million vehicles and to achieve the goal **"one charger for one vehicle"**
- **National subsidy policy** and most **local subsidy policies** for charging instruction contribution have been implemented

Battery Technology Improvement

- Battery overall performance, especially its **energy density** improved significantly as domestic technology advances

Electric Logistics Vehicle Market Keeps Developing

Demand Side

Urban Logistics Development

- **Urban logistics business develops rapidly** for the development of e-commerce, express business, cold chain and take-away food**,** and so brings growing demand for delivery vehicles
- Some regions execute traffic control for motor tricycle, and this also **enhances demand for delivery vehicles**
- Delivery vehicles use both traditional automobiles and EVs

Tightening Environmental Protection Policy

- China accelerates environmental protection during the 13th Five-Year Plan period, and local governments will **push development of electric vehicles**
- Operation of "yellow label" logistic vehicles is restricted in first and second-tier cities, while **electric logistics vehicles are not restricted from running or purchase, and enjoy preferential policy for parking**
- Tightening environmental protection policy may lead to supplanting of logistics vehicles that do not meet emission standards, which **may incur extra cost**

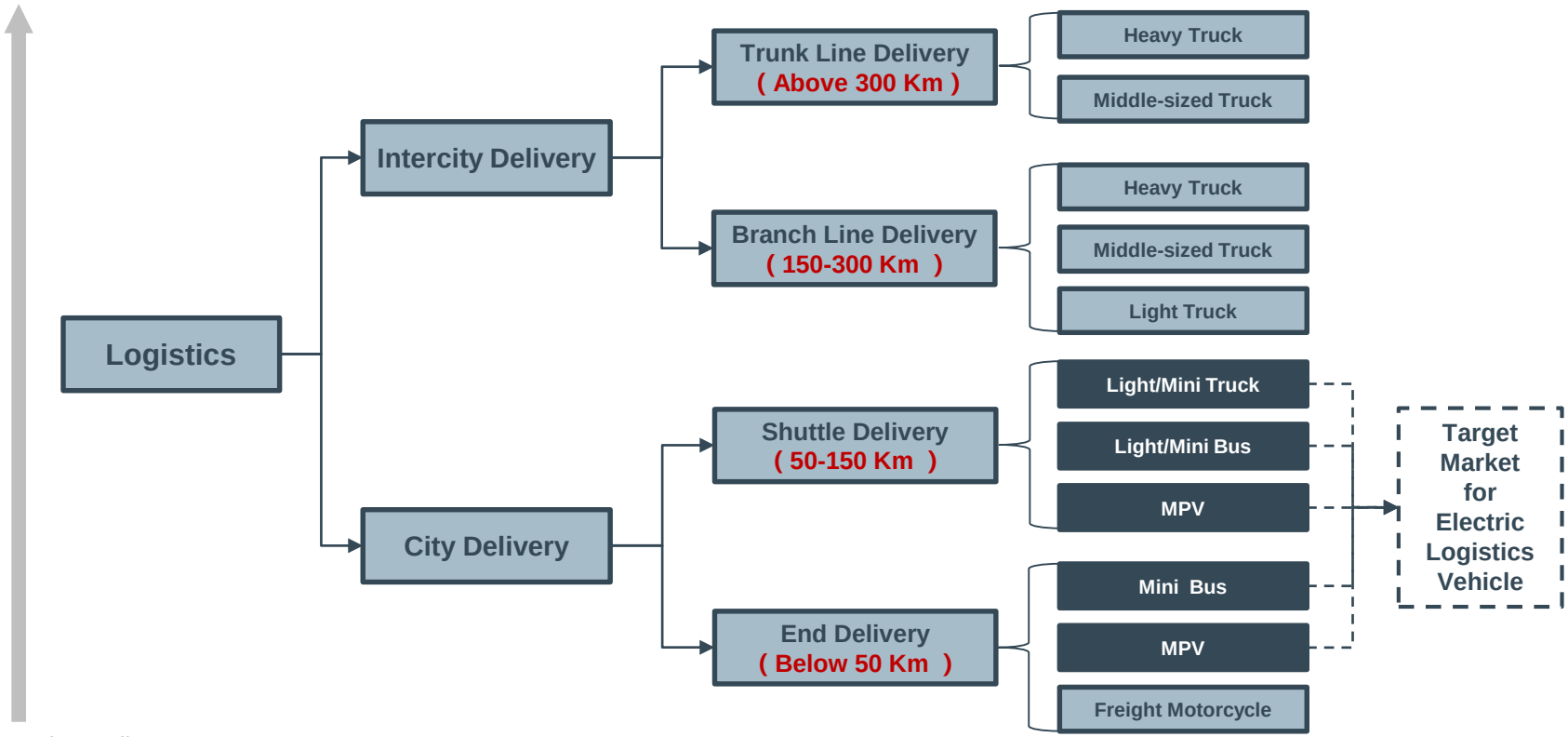
High Fuel Oil Cost

- Prices for domestic refined oil experienced several up-limit and **stay high**

Note:

Major impetus for* electric logistics vehicles *are support from national policy and rapid development of logistics in the first and second-tier cities

Market Size Analysis



**The Analysis is Based on Shipment Distance to Accurately Reflect Potential Markets of Electric Logistics Vehicle*

- Electric logistics vehicles are mainly used **for city delivery** with distance below 150km as their endurance is within 150-200km. With improvement of supporting facilities like charging points, electric logistics vehicles will be used for 150-300km **branch line delivery**
- Electric logistics vehicles mainly substitute **light truck (1.8-6 t), mini truck (below 1.8 t), light bus (3.5-7 m) and mini bus (no more than 3.5 m)**
- There are some errors in the logistics market estimates, for **MPV and mini bus** are usually used in logistics but **are included in passenger vehicle statistics**

Market Growth Forecast

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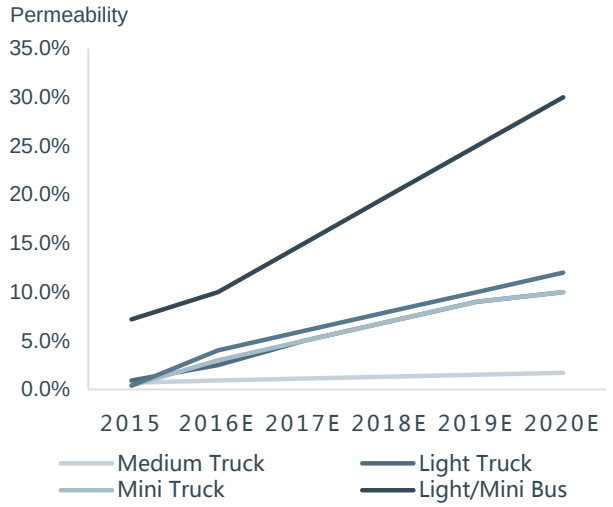
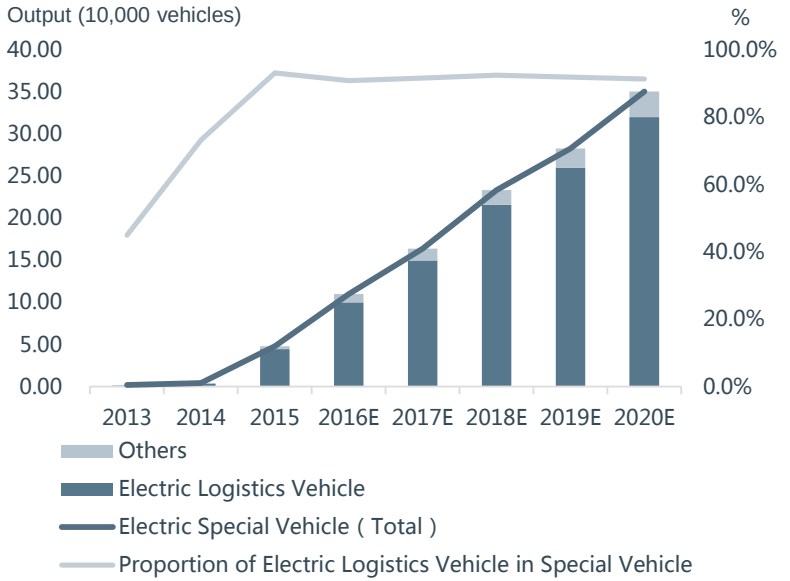
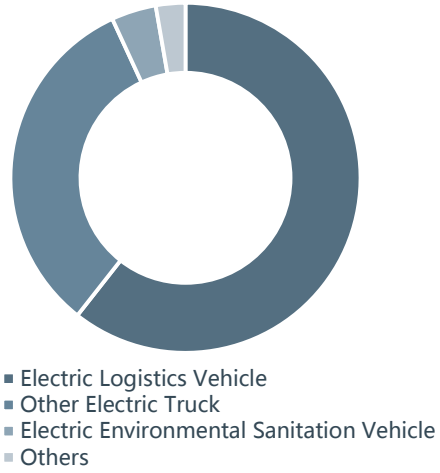
Permeability of China Electric Logistics Vehicle (2015-2020)



China Electric Logistics Vehicle Output (2015-2020)



Structure of China Electric Special Vehicle in 2015



- **Logic for Rough Estimate:** the permeability of electric logistics vehicles in the next 5 years can be calculated based on the forecast of growth speed in urban logistics industry and the proportion of vehicles used in logistics to their total production, and electric logistics vehicle output will thus be estimated
- **Conclusion:**
  - New electric logistics vehicle output in 2016: **42,500 medium, light and mini buses, 24,900 of light trucks and 13,600 of MPV**
  - New electric logistics vehicle output totaled **100,000 units** in 2016, and is expected to reach **320,000 units in** 2020
  - **Electric logistics vehicle will be major growth point** in electric vehicle industry in the following 5 years

Source：chinaev.org

Economic Analysis of Electric Logistics Vehicle

Analysis of Market Segments and Operational Models for Electric Logistics Vehicle

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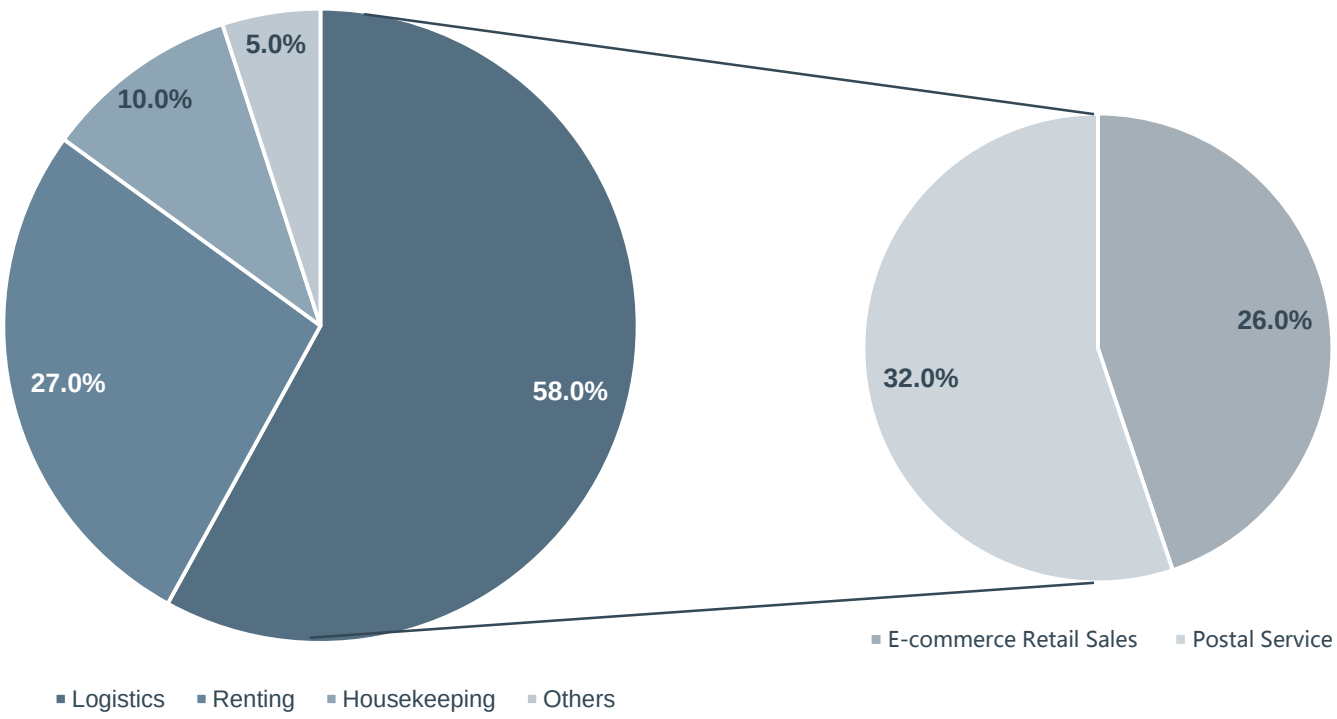
Market Share of Major Motive Lithium Battery Producers in 2015



- Over **50% electric logistics vehicles** are directly sold to **logistics companies.** With the development of logistics industry in the **first and second-tier cities**, the proportion of electric logistics vehicles in the total will rise
- Logistics companies are sensitive to cost. When combined with charging facility and vehicle technology factors, those companies **hesitate to purchase large amount of electric vehicles at one time**. So **renting electric logistics vehicle companies emerged**

Effects of Subsidy Policy on Electric Logistics Vehicle

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National Subsidy

- Subsidy Based On Battery Capacity
  - **RMB 1,800/kWh for capacity <50kWh**
  - RMB 1,500/kWh for 50≤ capacity<100kWh
  - RMB 1,000/kWh for capacity ≥100kWh
  - Ceiling limit is RMB 200,000 for each vehicle
- Transportation special vehicles must meet the following requirements:
  - Energy consumption of unit payload no more than **0.5** Ekg
  - Electric consumption per million km **no more than 13kWh**
- Battery used should meet the following requirements:
  - **Weight should be no more than 25% of the vehicle**

Local Subsidy

- Beijing:
  - **RMB 1800/kWh**
  - Ceiling limit is RMB **135,000** for each vehicle
- Shanghai:
  - **RMB 1500/kWh**
  - Ceiling limit of combined national and local subsidy is **50% of vehicle price**
- Guangzhou & Shenzhen:
  - **RMB 2000/kWh**
  - Ceiling limit is RMB **150,000** for each vehicle
- Jiangsu:
  - **RMB 400/kWh**
  - Ceiling limit of local subsidy is RMB **30,000** for each vehicle
  - RMB **30,000**
  - Ceiling limit of combined national and local subsidy is **60% of vehicle price**

Medium-Sized Truck	Light Truck	Light Bus	Mini Truck	Mini Bus	MPV
−	+	+	+	+	○

*Note : − *means policy has negative effect on breakdown markets*
\+ *means policy has positive effect on breakdown markets*
○ *means policy has no effect on breakdown markets*

Note:

Stepped national and local subsidy policies are particularly favorable for logistics vehicles with battery capacity below 70kWh, so more light and mini trucks and buses are used as electric logistics vehicles

Economic Analysis of Electric Logistics Vehicle

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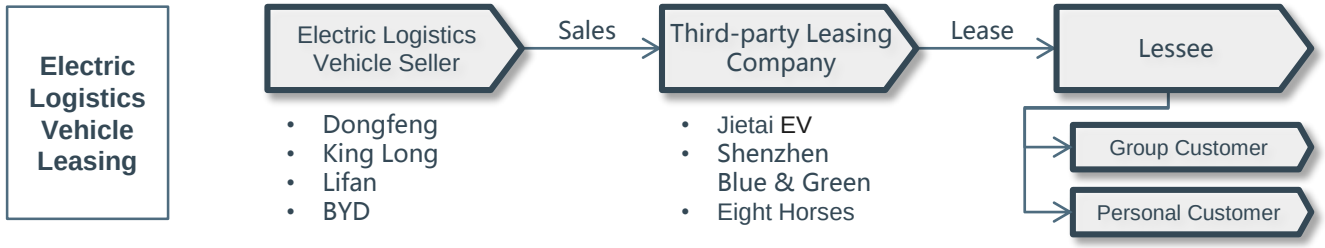
	Electric Logistics Vehicle Vs Traditional Logistics Vehicle			
	Beiqi Weiwang 307 Fuel Oil Type	**Beiqi Weiwang 307 Electric Type**	**Dongfeng U-vane Fuel Oil Type**	**Dongfeng U-vane Electric Type**
Endurance	*N/A*	140km	*N/A*	180km
Purchase Cost*	**RMB 49,000**	**RMB 63,800**	**RMB 142,800-177,900**	**RMB 165,000**
Fuel Charge/Electric Cost	RMB 18,000/yr	RMB 5,600/yr	RMB 40,600/yr	RMB 14,200/yr
Maintenance Cost	RMB 2,500/yr	RMB 800/yr	RMB 5,000/yr	RMB 5,000/yr
Total Operational Cost	**RMB 20,500/**yr	**RMB 6,400/**yr	**RMB 41,100/**yr	RMB **19,200/**yr
Life	5 years		5 years	
Total Cost In Service Life	**RMB 151,500**	**RMB 95,800**	**RMB 348,300-383,400**	RMB **261,000**

**Purchase cost includes purchase tax, less national and local subsidy*

- Direct purchase cost of electric logistics vehicles is much higher than traditional logistics vehicles, so price disadvantage of electric logistics vehicles **cannot be totally offset** by subsidy
- During total service life, **price advantage of electric fees compared to fuel charge** offset disadvantage of electric logistics vehicles
- In the long-term point of view**, electric logistics vehicles are more economics** than traditional logistics vehicles

Economics Analysis of Electric Logistics Vehicle Leasing



Third-party Car Leasing Company

- Major 4 leasing modes for electric logistics vehicle market
  - **Medium and long term leasing**
  - **Time-share leasing**
  - Orientation leasing
  - Customized leasing
- Effects from Electric logistics vehicle leasing on logistics companies
  - **Helping ease cash pressure for logistics companies**
  - **Extra benefit** in the long term
  - **Borrowers do not need to pay charging fees** due to vehicle-charger integrated operation
  - Value-added service such as car body advertising

Lease

Lessee

- Take one company for example which borrow Beiqi Weiwang 307 based on medium to long term leasing price
  - Daily charge RMB100
  - Weekly charge RMB 600
  - Monthly charge RMB 2,400
  - Annual charge RMB 25,000

Base on Beiqi Weiwang 307's total service life, all the leasing charges for 5 years are RMB 125,000, still lower than purchase cost for the fuel oil type.

- Borrowers do not need to pay maintenance charges, which **helps reduce time and cash cost**

- Time-share leasing meets the demand for 100 km service in first and second-tier cities, and reduce vehicle vacancy rate to the utmost, which is most convenient for borrowers and may become **the main leasing model**
- Time-share leasing is a asset-heavy investment so company should burden high operation costs. Now there is not a clear profit model, it may rely on profit from value-added service such as car body advertising in the future

Development Trend of Electric Logistics Vehicle

News at Electric Logistics Vehicle Producers in H1 2016

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Company	Order	Electric Logistics Vehicle Supply	Output Target in 2016
Dongfeng	Signing order with Hubei Dangdai Guosheng EV on January 6	25,000 vehicles	2,000 vehicles/yr of electric logistics vehicles and environmental sanitation vehicles at Shenzhen company
	Signing orders with Wuhan Zebra Running Technology	1,000 vehicles	
Nanjing King Long	Signing orders with Beijing Clean Vegetable Alliance on June 2, with total sales value above RMB 2 billion	8,000 vehicles	10,000 electric logistics vehicles and buses
Success Sales Company	Signing orders with 5 express companies in Shanxi on June 3	6,300 vehicles	N/A
Huacheng Xinyuan	Signing orders with ZTO Express	10,000 vehicles	5,000 T20 electric mini trucks and 5,000 X30 mini buses
BYD	N/A	N/A	7,500 vehicles/yr of electric logistics vehicles and environmental sanitation vehicles

Source：gg-lb.com

- Although the logistics vehicle state subsidies have not yet implemented, a large number of orders in the industrial has proved that **large-scale electric vehicle logistics vehicles will be produced**. **Many large orders for electric vehicle logistics remain being signed**, despite logistics vehicle company are mostly in the "silent" state in H1 2016
- As estimated before, electric logistics vehicle sales are expected to reach 100,000 units in 2016. Some regions require the percentage of electric logistics vehicle purchasing should be no less than 30%, and sales are expected to reach **150,000 vehicles in 2017, with CAGR reaching 50% in the next 5 years**

National Policy Analysis

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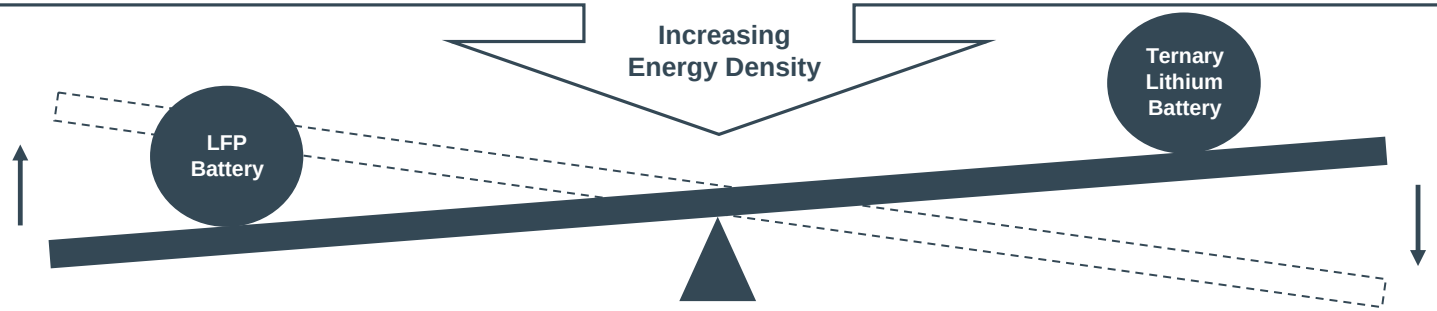
Policy	Comparison 2015	Comparison 2016	Effect
Subsidy	• RMB 1,800/kWh	• Cell capacity<50kWh，RMB 1,800/kWh • 50<=capacity<100kWh， RMB 1,500/kWh • capacity>=100kWh， RMB 1,000/kWh	−
Subsidy ceiling	• RMB 135,000	• RMB 200,000	+
Other subsidy restrictions	• None	• Energy consumption of unit payload no more than 0.5 Ekg • Electric consumption per million km no more than 13kWh • Battery weight should be no more than 25% of the vehicle	−



Note : − *means stricter requirements for lithium battery producers*
\+ *means loosening requirements for lithium battery producers*

- National subsidy policy makes **harsh requirements for vehicle weight**, which will push the vehicle lightweight and will boost development of **aluminum alloy material**
- Logistics vehicles require lower safety compared to commercial vehicles. Meanwhile, energy density is required to reach 300Wh/kg in the future, with cost falling below RMB 1. Theoretical energy density limit of LFP battery is 200wh/kg, which can not meet the requirement **so the permeability of ternary lithium battery will rise rapidly in the future**

Results of Existing Vehicle Types According to the New Policy

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Company	Dongfeng		HIGER		Beiqi	Lifan	Shanqi	FJ Motor
Type	/	T7	H4E	H5V	307EV	Fengshun EV	Dianniu No.1	Qiteng M70
Weight (kg)	2,250	3,455	1,460	3,320	1,610	1,310	1,325	1,370
Load (kg)	1,150	2,905	550	1,045	540	360	595	590
Battery Type/Source	Ternary	LFP	LFP	LFP	Coslight	LFP	Ternary	Lixiang
Battery Capacity (kWh)	50	75	39	69	38	26	35.7	32
Battery Weight (kg)	500	840	680	310	454	310	370	310
Max Speed (km/H)	85	95	100	80	70	100	75	100
Endurance (km)	185	155	150	180	150	150	190	171
Battery/Vehicle Weight Ratio	22%	24%	24%	20%	28%	21%	28%	23%
Unit Electric Consumption Per Million Km	12.01	14.00	17.81	11.55	15.45	17.47	14.18	13.66
Energy Consumption In Unit Payload (EKG)	0.47	0.33	0.95	0.73	0.94	0.66	0.63	0.63

**The items in the red frame are tested items for new national subsidy policy : Ekg no more than 0.5, electric consumption no more than 13kWh, battery weight no more than 25% of vehicle weight*
**Dark red data mean unqualified*

Source: Guojundianxin

Note:

According to sampling statistics, existing vehicle types do not meet requirements on Ekg, electric consumption per million km, and light weight indicator. When combined with loosening restrictions for ternary battery, electric logistics vehicles will increase use of ternary batteries in the near future

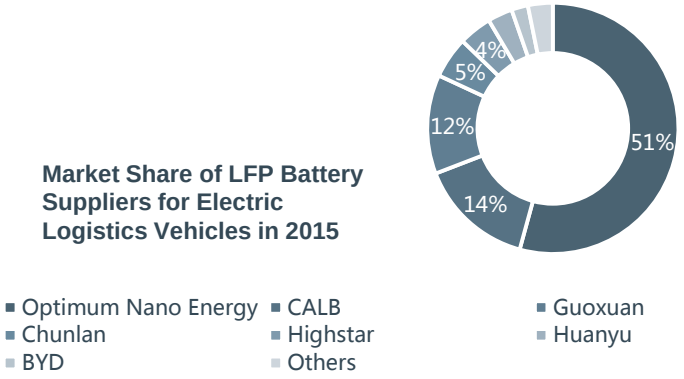
Battery Supply to Electric Logistics Vehicle Manufacturers

Company	Battery Type	Supplier
Dongfeng	Ternary	OptimumNano, Lishen, Boston
Shanqi	LFP	Hengyuan
	Ternary	First New Energy, BAK
Guohong	Ternary	First New Energy, BAK, SCST
Shandong Tangjun Ouling Automobile Manufacture	LFP	OptimumNano, Huanyu
Changan	LFP	Guoxuan, Guoneng, OptimumNano
	Ternary	Lishen
Lifan	LFP	Calb
	LMO	Chilwee, Phylion
Beiqi	LFP	Coslight
	Ternary	Pride
NLM Motor	LFP	Henan Lixiang
	Ternary	Samsung, Xintaihang, Baishun Songtao, Wisewod, Dlg
Byd	LFP	Byd (self-produced)
Hongxing	Ternary	Do-fluoride
King Long	LFP	Vaillant
	Ternary	Ankao

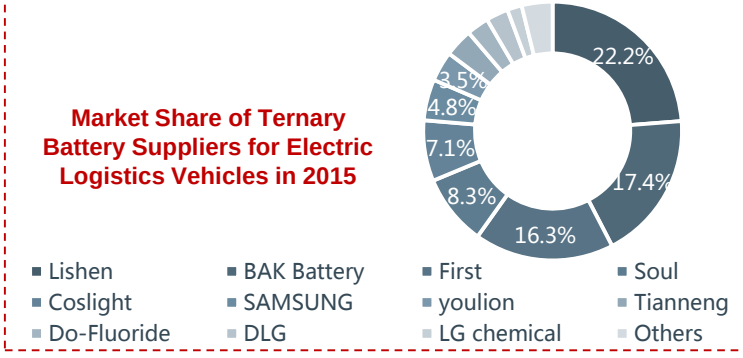
**The red means the company's major supplier*

Sources: Gaogong Industry Research & Changjiang Securities

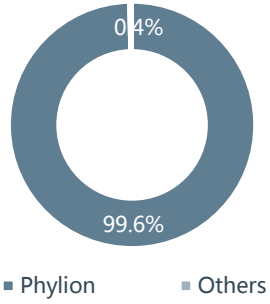
Market Share of LFP Battery Suppliers for Electric Logistics Vehicles in 2015



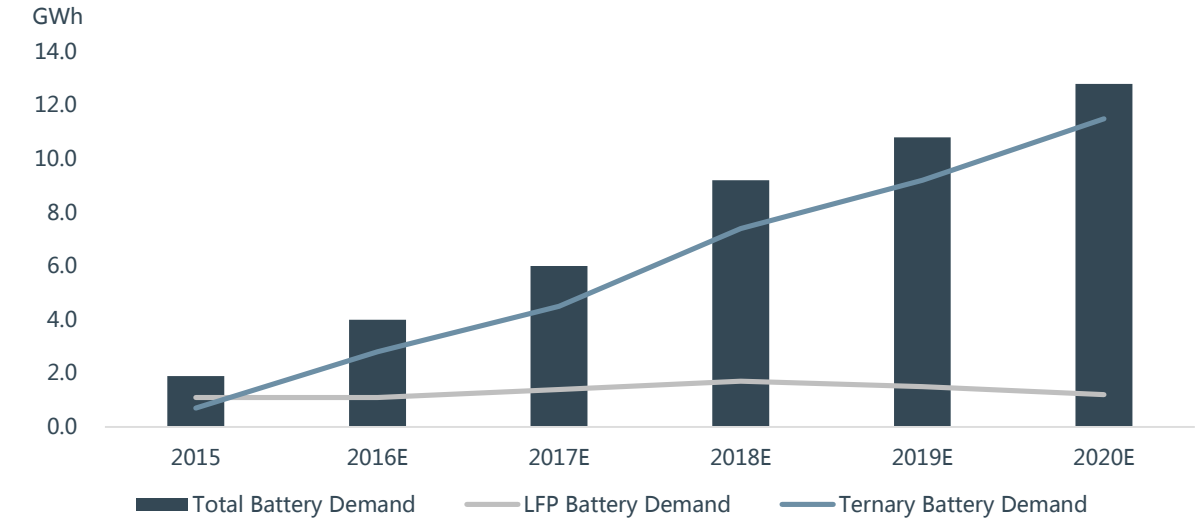
Market Share of Ternary Battery Suppliers for Electric Logistics Vehicles in 2015

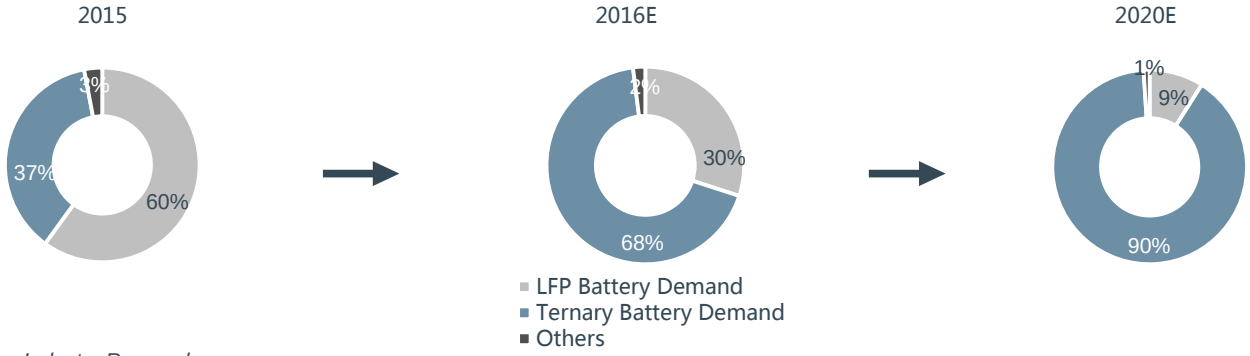


Market Share of LMO Battery Suppliers for Electric Logistics Vehicles in 2015



Battery Demand Forecast in Electric Logistics Vehicle Market





Source: Gaogong Industry Research

- The latest automobile manufacturing listed released by the MIIT on May 24 includes 218 types of EVs, with 103 types of electric special vehicles: 71 types using ternary material, accounting for 68% of the total, 22 types using LFP battery, and 7 types using LMO battery, with 3 types using lead-acid battery. This means **electric logistics vehicles will use ternary batteries in large scale**
- Combined with the calculation before, the permeability of ternary used in electric logistics vehicles will rise from **37% to 68% in** 2016

Influence and Focus of Lithium-ion Industry Upstream Material Plants

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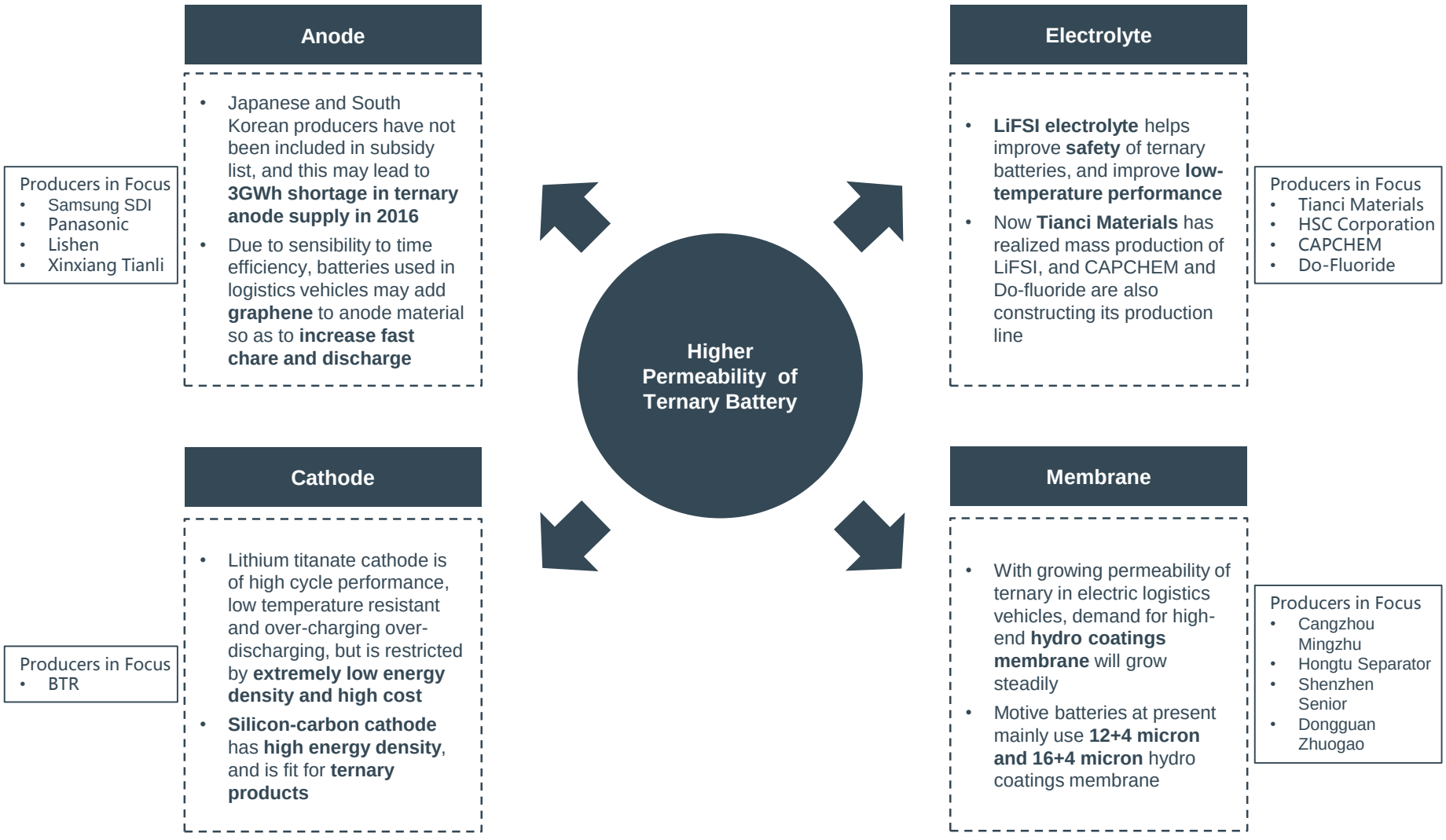

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