China Li-ion Battery E-News

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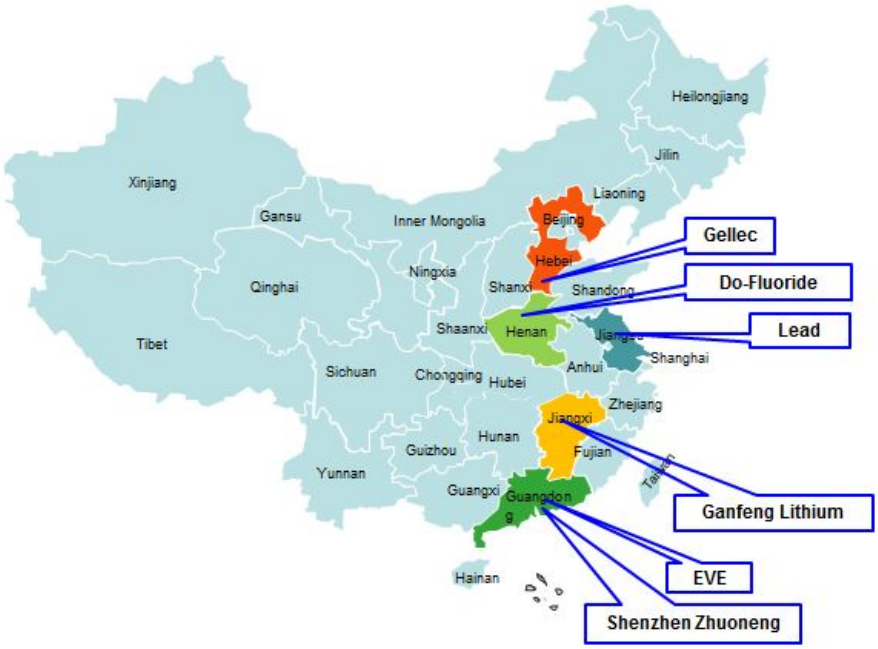
In Jan. 2017, Tesla Gigafactory initiated mass production, expected to have an annual output of 35 GWh Li-ion batteries in 2018, giving strong impetus to the development of relevant industries as Li-ion battery and electric vehicle.

At the end of Dec. 2016, the Notice on Adjusting Alternative Energy Vehicle Promotion and Application Financial Subsidy Policy was unveiled, which would adjust and improve the promotion and application subsidy policy.



Editor's Note

In Jan. 2017, China's Li-ion battery cell market recorded slight price changes and small transaction volume. Many manufacturers suspended production and some maintained small production for the coming peak sales. "The Spring Festival comes earlier this year, and the business was flat during this period. Our staff went back home for the festival earlier," stated a manufacturer, "The business will restart after the Lantern Festival." Impacted by the new AEV subsidy policy, the predictions on the market this year vary: positive and negative attitude co-exists.

- Cathode materials: raised quotations of LCO and ternary materials, caused by the frequent rises in price of cobalt salt. The price of LCO which is mainly targeted at 3C and is demanded well recently, is expected to continue rising, whilst the price of LFP in excess supply and in flat demand, will fall.

- Anode materials: stable prices and certain stock-up by downstream enterprises. The manufacturers in succession suspended production for the coming Spring Festival. "The shipments in 2016 rose significantly, mainly driven by power battery business," stated a trade source, "However, the price declined slightly."

- Separator: stable market with small price fluctuations, overcapacity for low-marketed products, and short supply of mid-marketed and premium products. In 2016, the output of wet process separator amounted to 390 million m^2, making up 42% of the total. It is expected that by 2018, the production will reach 800 million m^2, accounting for 50%+ of the sales, thanks to the rapid development of power Li-ion battery business.

- Electrolyte: stably operating business, with small changes in shipment and price. Downstream enterprises had certain stock-up and manufacturers in succession suspended production. "The shipment and price both increased significantly in 2016," commented a manufacturer, "However the profit decreased – the price raisings mostly were to cancel out the rises in prices of upstream lithium salts."

The USD/RMB exchange rate in this newsletter is USD1.00=RMB6.9498 on 3 Jan., 2017, sourced from the *People's Bank of China*. All the prices mentioned in this newsletter will include the VAT, unless otherwise specified.

If you would like to cover any specific topics or investigate any covered subjects in more details, please contact us on +86-20- 3761 6606, or econtact@cnchemicals.com.

Market Dynamics

Analysis on Li-ion battery wet process separator business in China

Summary: China's Li-ion battery separator industry develops rapidly, especially wet process separator business of which the scale growth far exceeds dry process segment, and will dominate the major separator market in the future.

** News on libattery.ofweek.com, translated by CCM.*

Wet process separator business far exceeds dry process separator one in scale growth

With the wide application and popularization of digital electronic products and alternative energy power category products, the global Li-ion battery market has achieved rapid increase, and its fast expansion in industry scale has given strong impetus to the high-speed increase of the entire separator industry. As relevant data indicate, the global Li-ion battery separator output has tripled from 500 million m^2 in 2010 to 1.42 billion m^2 in 2015. It is expected that the global Li-ion battery separator output will reach 1.72 billion m^2 in 2016.

Since China's Li-ion battery separator industry is at the high-speed development stage, domestic Li-ion battery separator output is growing all the time. Currently high-end wet process separators still rely on import, mainly used in high-end digital market and power battery market. In terms of market scale, wet process separator far exceeds dry process separator in scale growth. In 2016, China's Li-ion battery separator manufacturers produced 929 million m^2 with a year-on-year growth of 33.03%, of which wet process separator amounted to 390 million m^2, accounting for 42%. By 2018, China's wet process separator output will reach 800 million m^2, occupying over half of the market share in China's separator market.

Wet process separator becomes the mainstream in the next five years

In 2016, the top four global Li-ion battery separator enterprises were Asahi Kasei Corp, Toray Industries, Celgard Inc. (Celgard), and SK Innovation Co., Ltd. (SKI), respectively occupying 20.8%, 15.1%, 10.8% and 9.6% global market shares, altogether 56.3%. Three of the four enterprises follow technical path of wet process separator, and the rest only one dry process separator enterprise, Celgard, a U.S. company was acquired by Asahi Kasei Corp. due to its poor operation. Consequently, the technical path of wet process separator becomes world mainstream.

China's separator market is driven mainly by power market, high-end digital market and import-export trading. With the large-scale adoption of wet process separator by power battery in the future, China's Li-ion battery separator pattern will undergo enormous change, and wet process separator enterprises will experience higher growth speed and potential than their dry process counterparts.

The development of alternative energy vehicle market and the demand for tertiary materials boost the rapid demand for wet process separator. Currently domestic manufacturers all expand their wet process separator capacity, but due to the high barriers in the manufacturing technologies, the long production line construction cycle and the uncertainties in capacity attainment and actual capacity, high-end wet process separator market is still in short supply. For instance, Hunan Chinaly New Materials Co., Ltd. and Suzhou Jieli New Energy Materials Co., Ltd., have respectively reached 160 million m^2 and 120 million m^2 by the end of 2016, but

the majority of the capacity have to be put into production in the second half of 2016, and be transformed into effective capacity in the first half of 2017.

Lithium carbonate has another price raising

On 4 Jan., 2017, various domestic lithium carbonate manufacturers including Zhongsheng Lithium Industry Co., Ltd. (Zhongsheng Lithium), Sichuan Blossom Lithium Industrial Co., Ltd., Sichuan Blossom Lithium Industrial Co., Ltd. and Sichuan State Lithium Materials Co., Ltd. all raised the prices of lithium carbonate, with an increase of about USD71.94/t (RMB500/t) for both industrial grade and battery grade. The insiders deemed that the recent price change of lithium carbonate might be connected with the periodic recovery and the policy adjustment for the alternative energy vehicle.

It was the fourth adjustment made by the said three major lithium carbonate manufacturers since Nov. 2016. Taking Zhongsheng Lithium for an example, the previous three price raisings were on 7 / 29 Nov. and 28 Dec., 2016, all up by USD719.45/t (RMB500/t) for industrial grade, and by USD431.67/t (RMB3,000/t), USD1007.22/t (RMB7,000/t) and USD71.94/t (RMB500/t) separately for battery grade.

Company Dynamics

EVE forges strategic cooperation with Nanjing Jinlong

Summary: In Jan. 2017, EVE announced that it signed a *Strategic Cooperation Agreement* with Nanjing Jinlong, based on which the latter will purchase a total USD143.89 million (RMB1 billion) worth of power batteries.

** News on finance.sina.com.cn, translated by CCM.*

On 9 Jan., 2017, EVE Energy Co., Ltd. (EVE) made an announcement that the company signed a *Strategic Cooperation Agreement* with Nanjing Jinlong Bus Co., Ltd. (Nanjing Jinlong) on 7 Jan., based on which the two parties will conduct market development of power batteries for alternative energy vehicle (AEV) and establish a long-term cooperation. It is expected that the Nanjing Jinlong will purchase a total USD143.89 million (RMB1 billion) worth of power batteries in 2017.

Nanjing Jinlong, founded in Dec. 2000, mainly engages in manufacturing and marketing of AEV light bus, refitted vehicle and vehicle spare parts. It realized a sales of USD791.39 million (RMB5.5 billion) in 2015.

EVE has become one of the Li-ion battery suppliers with internationally advanced technical standard, and its fully-automatic power and energy storage battery production line has achieved mass production and sales, which has sustained a production capacity of 3.3 GWh/a. In the meanwhile, the company has successfully obtained access to the 4th batch of the enterprise catalogue for the *Industry Standards for Vehicle Power Storage Battery,* and is expected to develop a total capacity of 9 GWh/a in 2017.

As to the cooperation with Nanjing Jinlong, EVE revealed that it would be beneficial for the further expansion of its AEV business. If the agreement items are to be fully fulfilled, enormous positive influences will be brought about to its financial performance.

Hereby, CCM gave a well-organized account of EVE's strategic cooperation process from 2014-2016.

1. On 26 Jan., 2016, EVE signed a *Strategic Cooperation Agreement* with Chengdu Guibao Science and Technology Co., Ltd.,

forging a long-term cooperation on integrated solution of AEV power battery safety. Currently the agreement is in normal fulfillment.

2. On 30 Dec., 2015, EVE signed a *Strategic Cooperation Agreement* respectively with Beijing Offnenbach New Energy Technology Co., Ltd. (Offnenbach) and Nanjing Dongyu Offnenbach New Energy Technology Co., Ltd. (Dongyu Offnenbach). Due to this, Offnenbach and Dongyu Offnenbach have chosen EVE as the power battery supplier for the AEV project. Currently the agreement is in normal fulfillment.

3. On 2 Nov., 2015, EVE signed a *Strategic Cooperation Agreement* with Samsung SDI Co., Ltd. (Samsung SDI), establishing the cooperation on the authentication of power battery. Currently EVE's products have been well recognized by the engineers from Samsung SDI.

4. On 5 Dec., 2014, EVE (Guangdong) Energy Co., Ltd., a subsidiary of EVE, signed a *Strategic Cooperation Agreement on AEV Project with Nanjing Jinlong*. Based on this, EVE should purchase a USD8.59 million (RMB29.69 million) worth of AEVs from Nanjing Jinlong, in order to conduct testing on the battery's application and maintenance in AEV and acquire relevant data.

Shenzhen Zhuoneng raises USD21.58 million to invest in Li-ion battery

Summary: In Jan. 2017, Shenzhen Zhuoneng announced a new round stock issuing, a move intended to raise USD21.58 million to invest in the Li-ion battery projects constructed by its two subsidiaries.

On 6 Jan., 2017, Shenzhen Zhuoneng New Energy Co., Ltd. (Shenzhen Zhuoneng) announced a new round stock issuing, a move intended to issue 7.7 million shares priced no less than USD2.81/share (RMB19.5/share) to raise no less than USD21.58 million (RMB150 million) funding.

The company revealed that the fund would be mainly used in relevant projects construction for its two wholly-owned subsidiaries, Guangxi Zhuoneng New Energy Co., Ltd. (Guangxi Zhuoneng) and Shenzhen Tuosi Technology Co., Ltd. (Shenzhen Tuosi). Specifically speaking, those projects refer to "Guangxi Zhuoneng 5 billion Ah/a Power Li-ion Battery & 100,000 unit/a Alternative Energy Vehicle Power System Industrialisation Project (2nd section, 1st phase)", "Guangxi Zhuoneng Car Battery PACK Production Line Construction Project", and "Shenzhen Tuosi 3C Products PACK Production Line Construction Project".

As it is known, Shenzhen Zhuoneng engages in developing, manufacturing and marketing cylinder 18650 Li-ion battery cell and 18650 Li-ion battery pack. The first half of 2016 witnessed USD62.74 million (RMB436 million) in revenue with a year-on-year growth of 28.65%, and USD6.39 million (RMB44.4423 million) in net profit with a year-on-year growth of 1326.33%.

CCM deemed that the projects would further expand Shenzhen Zhuoneng's Li-ion battery capacity and enhance the competitiveness, which are embodied in the following aspects:

1. Founded in Feb. 2011, Guangxi Zhuoneng mainly engages in developing, manufacturing and marketing Li-ion battery cell. The newly invested Guangxi Zhuoneng 5 billion Ah/a Power Li-ion Battery & 100,000 unit/a Alternative Energy Vehicle Power System Industrialisation Project will amplify its capacity. Specifically, a total of USD23.89 million (RMB166 million) will be invested in the 2nd section construction of the project, of which USD9.74 million (RMB67.72 million) will come from the company and and USD14.12 million (RMB98.15 million) from funding to be raised.

2. In the meanwhile, the vehicle battery PACK production line newly constructed by Guangxi Zhuoneng can compact the costs of battery modules to a certain extent and further promote the market competitiveness of its products. Once the vehicle battery PACK production line is completed, the annual output is expected to be 50,000 sets. This project plans to use USD5.76 million (RMB40 million) funding to be raised.

3. Founded in Feb. 2011, Shenzhen Tuosi mainly engages in the production and marketing of portable power source and power battery. This newly constructed 3C products PACK production line by Shenzhen Tuosi will contribute to the effective control over the overall product quality. It is expected that USD1.73 million (RMB12 million) will come from the funding to be raised.

Lead to acquire Titans with USD194.25 million

Summary: In Jan., 2017, Lead made an announcement that the company attempted to acquire 100% shares of Titans with USD194.25 million (RMB1.35 billion) by means of issuing shares and paying in cash.

** News on http://finance.ifeng.com, translated by CCM.*

On 6 Jan., 2017, Wuxi Lead Intelligent Equipment Co., Ltd. (Lead) made an announcement that the company attempted to acquire 100% shares of Zhuhai Titans Power Electronics Co., Ltd. (Titans) with an expected transaction price of USD194.25 million (RMB1.35 billion) by means of issuing shares and paying in cash.

Specifically speaking, the share will be priced at USD4.89/share (RMB33.98/share). In the meanwhile, the company revealed that it would conduct private placement for no more than five specific investors by means of enquiry, planning to raise supporting fund of no more than USD89.36 million (RMB621 million).

As it is known, Titans was founded in Feb., 2014, a manufacturer of developing, manufacturing and marketing energy recycling battery formatting, grading, selection and various battery cells, and module testing equipment. Its downstream customers include BYD Company Limited, Camel Group and China Aviation Lithium Battery Co., Ltd. etc.

As far as CCM's concerned, Lead acquired Li-ion battery rear-end production equipment supplier, which would further consolidate Lead's comprehensive strength in Li-ion battery industry.

1. It can realize the company's intensive growth. In the eye of Lead, the acquisition of Titans was a critical strategy for the listed company to further enlarge and strengthen its extensive growth in Li-ion battery automatic equipment area. Since both parties belong to the special equipment manufacturing industry, which can facilitate advantageous business collaboration and extend the business chain of Li-ion battery production equipment for the listed company, for the purpose of establishing the strongest domestic Li-ion battery automatic production equipment brand and service solution provider.

2. It can promote the company's profitability. Related principals of Lead commented that once this transaction was completed, the company would further expand its revenue sources and disperse operational risks. In the meanwhile, the company will fully utilize its advantages in its platforms and marketing channels to enhance Titans' marketing capability in Li-ion battery automatic production equipment industry, thus boosting the company's profitability. Titans revealed that after the completion of the sale, it would focus on its major business, the development and manufacturing of electric vehicle charging facilities, and the investment and operation of electric vehicle charging network.

Panasonic presents flexible Li-ion battery at CES

Summary: In Jan. 2017, Panasonic exhibited a new flexible and foldable Li-ion battery at CES with small size and small battery capacity, which is expected to be applied in wearable equipment and equipment for the Internet of Thing.

** News on www.itdcw.com, translated by CCM.*

On 5 Jan., 2017, the Consumer Electronics Show 2017 (CES) was held in Las Vegas. Panasonic Corporation (Panasonic) exhibited a new flexible Li-ion battery with only 0.45 mm in thickness and relatively small battery capacity. Made of extremely thin silver wafers, it can sustain 80% power storage capability after being bent or twisted for 1,000 times. There were altogether three versions of that new battery presented by Panasonic, each a little bit smaller than credit cards but foldable. The battery capacity of the largest version CG-064065 equals 60 mAh, and the smallest only 17.5 mAh.

Yoriko Yagi, supervisor assistant of the Wearable Energy Division of Panasonic, claimed, "We are increasing the quantity of small-sized equipment, such as wearable equipment, and equipment for the Internet of Thing. Since the design of those equipment determines the size of the battery, we have to produce smaller battery to downsize the equipment."

Reportedly, this project was initiated in 2008 and has been under quantity production currently.

Many other companies and researchers have been conducting researches on flexible Li-ion battery, but Yagi mentioned that the battery developed by Panasonic boasts the best performance and currently best testing records.

To develop this flexible battery, Panasonic reconsidered the battery design. Generally speaking, the interior reaction structures of Li-ion battery are all cylindrical, and their negative and positive poles are mutually wrapped. But if the structure is bent or folded, the outermost layer will be farther away from the innermost, leading to failure of connection between the negative and positive poles and gradual dissipation of battery capacity. Therefore, to obtain a flexible battery, researchers in Panasonic decided to give up the cylindrical structure to avoid the mutual wrapping of the both battery poles; instead, they piled the battery poles on a thin rectangular wafer, and wrapped the battery with a special aluminum shell of excellent ductility.

Another challenge lies in how to charge the battery. The battery has to be charged wirelessly, since Panasonic doesn't want to spare room for the charging part in such a slim battery design. Unfortunately, the battery capacity of the most wireless charging units in the market are too large for small-sized equipment, while the flexible battery developed by Panasonic can only bear 60 mAh charging current. In the last resort, Panasonic designed its own wireless charging station, which will be marketed in bundle sales with batteries. As Yagi put it, when applied in comparatively less complicated equipment (such as fitness pedometer), this battery can sustain 4 weeks after charging.

Upstream Dynamics

Ganfeng Lithium to acquire 19.9% stake in Lithium Americas

Summary: On 18 Jan., 2017, the board of directors of Ganfeng Lithium passed the proposal that GFL International would acquire 19.9% of shares in Lithium Americas.

On 18 Jan., 2017, Jiangxi Ganfeng Lithium Co., Ltd. (Ganfeng Lithium) made an announcement that the company's board of director examined and approved the proposal that GFL International Co., Ltd. (GFL International), its wholly-owned subsidiary, would acquire 19.9% of shares in Lithium Americas Corp. (Lithium Americas) with its own funding of USD49 million. Once the transaction is completed, GFL International will become the largest shareholder of Lithium Americas.

In the meanwhile, the board also approved the *Proposal of GFL International to Provide Financial Support for Lithium Americas,* based on which GFL International should provide no more than USD125 million development loan for Lithium Americas without affecting its own normal operation.

Reportedly, Lithium Americas is a Canadian resources company, which used to be Western Lithium USA Corp., possessing 50% interests of Argentinean Cauchari-Olaroz lithium project and 50% exclusive product selling rights of that project just as Soquimich Commercial S.A. (SQM) does. Once the transaction is completed, GFL International will exclusively sell the 20% lithium products of Cauchari-Olaroz lithium project enjoyed by Lithium Americas for 20 years starting from the day when the project is put into operation with the same market price as SQM. Moreover, Lithium Americas also possesses the Lithium Nevada project in Nevada, the US.

Based on the financial data of 2016, Lithium Americas occupied USD50.54 million total assets and USD4.81 million net assets by 30 Sept., 2016.

As to this acquisition, Ganfeng Lithium expressed that this transaction aimed to extend the company's completeness of lithium supply chain and strengthen its long-term competitiveness. Once the transaction is completed, Lithium Americas will directly provide lithium resources for the company.

According to CCM's research, currently domestic Li-ion battery enterprises are accelerating their purchasing of international lithium ore resources.

Represented by Ganfeng Lithium, apart from the acquisition of Lithium Americas, the company has long started its oversea expansion since 2015. In July 2015, GFL International announced to acquire no more than 49% of shares in Reed Industrial Minerals Pty Ltd (RIM) with no more than USD61 million by instalment. On 2 Dec., 2016, GFL International purchased 2 million shares in International Lithium Corp. from TNR Gold Corporation (TNR) priced at CAD0.15/share with its own funding.

There are several points to explain domestic Li-ion battery enterprises' going abroad.

1. Restricted mining efforts at home. China has abundant lithium reserves accounting for 13.6% of the global total, but 85% domestic lithium resources belong to salt lake resources, and the rest are spodumene and lepidolite. Currently the comparatively well-exploited resources globally are spodumene and salt lake resources, but the lithium extraction technique are lagging behind at home, resulting in low level exploitation.

2. Domestic lithium ore resources are exhausted from exploitation. The recent years have witnessed the rapid development of AEV industry, posing strong demand on domestic lithium ore resources. Domestic lithium resources have already been occupied by Tianqi Lithium Co., Ltd., Tibet Mining Industry Group Co., Ltd. and Qinghai Lithium Co., Ltd., with little remained.

Xinghua Lithium puts 10,000 t/a lithium chloride project into operation

In Jan. 2017, Xinghua Lithium Co., Ltd. (Xinghua Lithium, in Qinghai Province) successfully initiated the commissioning test run of its first-phase project of 10,000 t/a lithium chloride and 25,000 t/a refined boric acid, symbolizing a new breakthrough in lithium extraction process from salt lake.

The company, with an investment of USD93.10 million (RMB647 million), adopted advanced extraction technique as specific to the high magnesium / lithium ratio feature of Da Qaidam Salt Lake and effectively tackled the worldwide conundrum of extracting lithium chloride from the salt lake with high magnesium / lithium ratio.

The project was designed in an integrated manner entrusted to the Beijing General Research Institute of Mining & Metallurgy, with renowned experts as the technical advisor, contributing to four new highly effective extraction solvents out of independent research and development and four national invention patents.

Dongguan Kaijin invests USD51.8 million in anode material project

On 1 Jan., 2017, Dongguan Kaijin New Energy Technology Co., Ltd. (Dongguan Kaijin) published its first stock issuance scheme for 2017, attempting to issue no more than 3 million shares priced no more than USD4.75/share (RMB33.00/share), for no more than USD14.25 million (RMB99 million) funding.

As it is known, Dongguan Kaijin mainly aimed to complement the financing gaps (about USD14.39 million (RMB100 million)) for the seasoned equity offerings on 30 Sept., 2016 for this fund raising. Before the announcement of the stock issuance scheme, the company revealed outcome of the seasoned equity offerings that it issued 8,243,200 shares priced USD4.54/share (RMB31.54/share), raising altogether USD37.41 million (RMB260 million).

Dongguan Kaijin revealed that the funds raised from the two rounds of financing would all be devoted to the supporting, R&D devotion and complement of circulating funds for the anode materials. The project requires altogether USD51.80 million (RMB360 million) funding, of which USD37.41 million (RMB260 million) will be devoted to the land purchasing and anode materials supporting, USD7.19 million (RMB50 million) for the development of new anode materials, and USD7.19 million (RMB50 million) for the completion of operation capital, and the insufficient part for the project will be solved by the company itself.

** News on www.escn.com, translated by CCM.*

Gellec: separator production capacity up by 25 million m2/a

On 29 Dec., 2016, Hebei Gellec New Energy Material Science & Technology Co., Ltd. (Gellec) made an announcement that the company has completed the installation, commissioning and testing for its 2nd production line of high-performance wet process polyethylene Li-ion battery separator with an annual output of 25 million m^2, which have reached various standards and been successfully put into operation. It is expected that the company will realize an annual total capacity of over 40 million m^2 afterwards.

Reportedly, apart from the 2nd production line already in operation, the company has been conducting construction on its 3rd and 4th wet process separator production lines project with an annual production capacity of 200 million m^2 , which will be put into operation in succession in the second half of 2017. By then, the company can achieve an annual production capacity of 240 million m^2.

Founded on 5 Feb., 2010, Gellec, is a comprehensive enterprise for the development, manufacturing, marketing and service of Li-ion battery materials.

** News on www.gg-lb.com, translated by CCM.*

Downstream Dynamics

China EV100 Forum

Summary: In Jan., China EV100 Forum 2017 was held in Beijing themed "Upgrade Core Technology, Innovation Leads the Future".

** News on libattery.ofweek.com, translated by CCM.*

On 14 Jan., China EV100 Forum 2017 was held in Beijing, attended by a hundred odd participants in various areas as relevant government ministries, scientific research, automobile, transportation, electric power, energy, information and investment.

Themed "Upgrade Core Technology, Innovation Leads the Future", the forum focused on the supply side reform and innovation development of electric vehicle (EV) industry, and probed into the policies for the industry's sustained development. Closely centering on the cutting-edge technology of EV and the industry's development pattern, cultivation of globalized brand for EV with powerful technology, EV market reform and enterprise strategic pattern, and industry policy changes, the forum lasted two days in discussion.

Participating experts pointed out that China has become the globally largest EV market, but problems as companies' excessive attachment to scale growth, inadequate attention to technological innovation and reliance on government subsidies are still prominent and risks of backward technique still exists. Promoting the industry's development relies on the government policy support, and further technology breakthrough and innovation.

On the forum, Wang Chuanfu, the president of BYD Company Limited conducted analysis on the future development tendency of EV industry. He revealed that the sales volume of EVs reached over 507,000 in 2016, accounting for 67% globally. Meanwhile, the sales of buses (excl. buses for tourism) amounted to around 100,000, of which electric buses made up 87% (= about 87,000). Based on the development tendency, in 2018, the fuel oil vehicles in China's public transportation area will be replaced by EVs. Moreover, in the following years China's taxis will embrace a fully electric-oriented progress.

Jiang Bing, vice general manager of State Grid Electric Vehicle Service Co., Ltd. showed that by 2020 China's EV battery will be half priced with doubled energy density, easily charged and over 400km battery life in general which equals that of the fuel oil vehicle.

Chen Qingtai, director general of China EV100 summarized that in 2016 the development of China's EV has transferred from lead-in stage to development stage, with the competition between the domestic enterprises as the prelude and the future international competition as the real challenge. China's EV industry should make medium and long-term development strategy, ceaselessly strengthen R&D ability, and possess core technology, thus establishing remarkable self-owned brands with premium quality and taste to win over the market. Moreover, it is indispensable to timely deploy "EV + Internet", for only by organically integrating alternative energy, smart transportation and smart city by means of internet can the potential social benefits of low carbon-driven, information-oriented and intelligent-based EV be fully expressed.

Do-Fluoride makes progress in AEV business

Summary: In Jan. 2017, Do-Fluoride announced that one of it's subsidiaries AEVs had been listed in the latest government recommended automobile catalogue. CCM believes that this year, 2017, will be the first year in which Do-Fluoride accelerates AEV business development and turns a profit, given that a proposal to adjust subsidies offered has already been issued.

In early Jan. 2017, Do-Fluoride Chemicals Co., Ltd. (Do-Fluoride) announced that its subsidiary, Hebei Hongxing Automobile Manufacturing Co., Ltd. (Hebei Hongxing) had had its product listed in the *5th Catalogue of Alternative Energy Vehicle Recommended for Promotion and Application,* which was released by the Ministry of Industry and Information Technology of the People's Republic of China (MIIT) at the end of Dec. 2016.

The product in question is a "Hongxing" all-electric van (Type HX5029XXYAVEV), which has been designed chiefly for the covered transportation of goods.

This listing is beneficial to Hebei Hongxing's business development and expansion, and lays the foundation for its future development to a certain extent. Meanwhile, it is a strong counter to the rumour it has stopped manufacturing alternative energy vehicles (AEV).

An automobile manufacturing plan was unveiled by Do-Fluoride in Aug. 2015, the aim of which was to produce 14,000 electric vehicles in 2016, 30,000 in 2017 and 100,000 in 2018. However, the company fell short of its 2016 target by a significant margin, and this could make future targets harder to meet.

However, in recent years, Do-Fluoride has made great efforts and achievements in the AEV business. CCM believes that this year, 2017, will be the first year in which the company steps up AEV business development and starts to turn a profit.

This is mainly because:

1. Proposal to adjust subsidies already issued

In 2016, the Chinese government suspended the offering of subsidies after a check on "subsidy cheats" was conducted. This meant that most of the subsidies for 2015 and all subsidies for 2016 were not provided, resulting in AEV manufacturers having to

pass on the subsidies to their clients themselves, and facing increasingly heavy capital pressure. Some manufacturers were even in arrears to their battery suppliers, or were forced to reduce / suspend production.

Do-Fluoride were no exception, and attributed the slowdown in developing its AEV business to the lack of subsidies provided, "Without subsidies it is difficult for us to turn a profit currently. It is not the right time to launch products."

At the end of Dec. 2016, China's Ministry of Finance, Ministry of Science and Technology, National Development and Reform Commission and MIIT jointly issued the *Notice to Adjust Subsidy Policy for Alternative Energy Vehicle Promotion and Application*. Although the value of subsidies has declined by 20-40% following this adjustment, at least companies are now being subsidised, helping them to stabilise their capital chains and steadily advance their businesses.

2. Enhanced funding capability

Earlier, in Aug. 2016, Do-Fluoride increased Hebei Hongxing's capital by USD29.85 million (RMB200 million), a move intended to strengthen the latter's ability to develop technology and improve product performance. Due to this, Do-Fluoride now holds a 85.294% stake in this subsidiary.

Later, in Nov. 2016, Do-Fluoride supplemented the working capital of its fully-owned subsidiary Do-Fluoride (Jiaozuo) New Energy Technology Co., Ltd. (which specifically produces Li-ion batteries) by using reserves of USD43.17 million (RMB300 million). This effectively decreased the financial cost.

3. Improved supporting facilities

In recent years, Do-Fluoride has carried out business activities in the AEV segment frequently. For instance, the company's expanded lithium hexafluorophosphate ($LiPF_6$) production facility, the total production capacity of which has been doubled from 3,000 t/a to 6,000 t/a, is expected to go into operation in Q1 2017; its 300 million Ah/a high energy power Li-ion battery pack project, investment in which totals over USD20.14 million (RMB140 million) so far, began operations at the end of Q3 2015.

In addition, Do-Fluoride announced the investment of USD741.03 million (RMB5.15 billion) in a new AEV power assembly project (production capacity: 300,000 unit/a) in Nov. 2016, intending to better control core AEV technology.

Tesla Gigafactory starts mass production

Summary: In Jan. 2017, Tesla Gigafactory initiated mass production, expected to have an annual output of 35 GWh Li-ion batteries in 2018, giving strong impetus to the development of relevant industries as Li-ion battery and electric vehicle.

** News on www.itdcw.com, translated by CCM.*

Tesla Motors, Inc. (Tesla) Gigafactory has initiated its mass production at the first week in Jan. 2017, probably serving as a turning point for global energy storage industry, as the foreign sources reported.

The batteries manufactured by Gigafactory will be utilized in Tesla's Model 3 electric vehicle (EV) and its energy storage system. As Tesla predicted, by 2018 it would have an annual output of 35 GWh Li-ion batteries.

Up to now, battery production has always been dominated by companies outside the US. In 2016, about 88% batteries were

produced in China, South Korea and Japan, but with the initiation of mass production in Tesla Gigafactory, the market share distribution might be enormously changed.

The progressively enhanced automation, standardization, scale-effect and technology as well as the constantly declining capital investment for every watt hour capacity might reduce the costs of the entire EV industry. Reportedly, the battery price of EV has reduced by 22% in 2016 and will continue to decline by 15% to 20% this year.

Apart from reducing the costs for EV industry, the doubled global battery capacity will also accelerate the development of lithium industry. Research concerned claimed that the lithium used by an EV is 4,800 times as much as that by smart phone, resulting in a tense supply of lithium when the adoption rate of EV is promoted. The global demand of lithium in 2025 will lead to a compound growth of 16%.

The price for lithium has skyrocketed by 60% in 2016, and doubled the price compared to the past three years. Despite the fact that there are only four major lithium ore suppliers globally, smaller ore suppliers are increasing all the time, some of which are in Nevada, where locates abundant lithium resources (it is definitely not a coincidence when Tesla located itself here). As Financial Times put it, lithium reservation is not scarce in the world, but it is still a technique conundrum to explore the lithium, which means the lithium ore suppliers can hardly meet the market demand.

Lithium supply will become a critical restraining factor for battery capacity increase, which to a large extent determines the launch of new EVs. In Dec. 2016, the sales volume of EVs in the US reached a record high of 25,000, but still account for less than 1% of the monthly total. However, the number is increasing rapidly, with 37% increase in 2016 compared to the previous year. In the following few years, Tesla Gigafactory will further stimulate the marketing of EVs.

AEV subsidy adjustment plan unveiled

Summary: At the end of Dec. 2016, the *Notice on Adjusting Alternative Energy Vehicle Promotion and Application Financial Subsidy Policy* was unveiled, which would adjust and improve the promotion and application subsidy policy.

** News on www.gg-lb.com, translated by CCM.*

On 29 Dec., 2016, China's Ministry of Finance, Ministry of Science and Technology, and Ministry of Industry and Information Technology and National Development and Reform Commission jointly issued the *Notice on Adjusting Alternative Energy Vehicle Promotion and Application Financial Subsidy Policy.* Compared with previous subsidy policies, there are several major adjustments as follows.

1.The standard for the recommended vehicle type catalogue is raised and subjected to dynamic adjustment.

2. The subsidy standard declines enormously by 20%-40% except for fuel cell electric vehicle.

3. Specific regulations have been confirmed on the subsidies for local governments, which will not exceed 50% of the vehicle subsidy from the central finance.

4. The payment for subsidies have been changed from previous pre-funding to annual clearing.

5. Non-personal users have to satisfy the requirements of accumulated driving distance before applying for subsidy when

purchasing alternative energy vehicle (AEV): the accumulated driving distance should amount to 30,000 km (except for job class special vehicles).

6. Power battery acts as the core for the subsidy and its energy density determines the subsidy adjusting index, especially for alternative energy passenger vehicle whose subsidy varies a lot due to different performance rate.

7. Except for fuel cell vehicles, subsidy for various vehicle types will continue to fall by 20% on the basis of current standard concerning the subsidy standard and upper limits from central and local government from 2019 to 2020.

Analysis institutes in the industry deemed that the adjustment of policy would bring the following influences to the industry:

1. "Subsidy fraud" will be combated and the subsidy fund will flow into the superior enterprises. Subsidy policies in and before 2016 are comparatively extensive and loose, taken advantage by quite a few inferior and underqualified automakers, thus disrupting the industry development. The new subsidy plan can confirm the subsidy amount by measuring multiple evaluation index, such as power battery energy density, power consumption/100km/1000kg, power consumption/100km and accumulated driving distance to curb the subsidy frauds.

2. Since the beginning of 2017, the cost pressure of the industry chain becomes intensified. The enormous adjustment in subsidies and the adoption of annual clearing for subsidies also exert higher requirements on the fund of the AEV manufacturers. Since AEV is still priced higher than traditional fuel vehicle, its price should be reduced to a certain extent for the sake of circulation. Therefore, in 2017 lowering costs will be one of the core tasks for AEV manufacturers. Moreover, higher requirements for the performance of core spare parts as the power battery of the vehicle, and more emphasis on the security demand more R&D devotion of the AEV manufacturers. Seized by the dual pressure of delayed subsidy and increased devotion, AEV manufacturers are confronted with huge capital pressure and urgent demand for lowering costs, which require the coordination of the industrial chain, and strong support from suppliers with strong capital and technical strength. In 2017, AEV manufacturers should attach more importance to the products performance and R&D strength when sifting suppliers. Consequently, suppliers of large scale and strong R&D strength can benefit more, while suppliers with low-end capacity, slow R&D updating speed and insufficient fund will be weeded out.

Nanjing Jinlong passenger vehicle manufacturing base to start up in H2 2017

On 15 Jan., 2017, Nanjing Jinlong Bus Co., Ltd. (Nanjing Jinlong) officially announced the development plan for alternative energy vehicle (AEV) passenger vehicle market in 2017, which indicated that the passenger vehicle manufacturing base with an annual output value of USD28.78 billion (RMB200 billion) would be initiated in the second half of 2017 mainly for the production of AE-SUV and AE-MPV.

The manufacturing base is located in Lishui Development Zone with a predicted total investment of USD719.45 million (RMB5 billion). When completely established, it will gradually realize an annual production of 1 million vehicles with an annual output value of USD14.39 billion (RMB100 billion).

Reportedly, Nanjing Jinlong has achieved remarkable performance in 2016, laying a solid foundation for its further development in 2017. Specifically speaking, its Kaiwo vehicle has obtained access to the 4th batch electric bus memorandum directory of Beijing, with a sales volume of 300 electric buses and 200 electric logistic vehicles. In the meanwhile, in the aspect of bus export, Nanjing Jinlong has made enormous breakthroughs in South Korea, Thailand and Hong Kong.

Import & Export

Import and export of major Li-ion battery materials and Li-ion batteries in China in Nov. 2016

Table 1: China's imports of major Li-ion battery materials, Nov. 2016

Product	Volume, tonne					Price, USD/t				
	Nov. 2016	Oct. 2016	Nov. 2015	MoM change	YoY change	Nov. 2016	Oct. 2016	Nov. 2015	MoM change	YoY change
Lithium carbonate	2,407.82	1,922.04	727.06	25.27%	231.17%	10,775	11,200	5,840	-3.79%	84.51%
Lithium manganate (LMO)	1.60	0.34	0	373.37%	/	9,916	34,281	/	-71.07%	/
Lithium ferrous phosphate (LFP)	266.43	328.16	276.16	-18.81%	-3.52%	13,191	13,852	13,530	-4.78%	-2.51%
Lithium nickel cobalt manganate (NCM)	330.24	162.44	11.69	103.30%	2723.98%	23,074	23,999	21,240	-3.86%	8.63%
Ethylene polymer battery separator	730.19	625.94	710.32	16.65%	2.80%	51,163	54,137	49,920	-5.49%	2.49%
Propylene polymer battery separator	163.31	111.68	114.96	46.23%	42.06%	52,217	47,652	53,930	9.58%	-3.18%
Artificial graphite	1,212.55	1,362.25	1,171.86	-10.99%	3.47%	8,127	6,928	8,360	17.30%	-2.78%

Source: China Customs & CCM

Table 2: China's exports of major Li-ion battery materials, Nov. 2016

Product	Volume, tonne					Price, USD/t				
	Nov. 2016	Oct. 2016	Nov. 2015	MoM change	YoY change	Nov. 2016	Oct. 2016	Nov. 2015	MoM change	YoY change
Lithium carbonate	114.21	83.83	156.31	36.25%	-26.93%	21,029	26,709	8,040	-21.27%	161.55%
Lithium manganate (LMO)	33.35	15.60	92.63	113.78%	-64.00%	8,000	8,000	6,700	0.00%	19.40%
Lithium ferrous phosphate (LFP)	10.22	0.18	23.76	5577.78%	-56.99%	14,484	20,367	19,500	-28.88%	-25.72%
Lithium nickel cobalt manganate (NCM)	481.19	378.14	530.26	27.25%	-9.25%	19,360	19,491	16,310	-0.67%	18.70%
Ethylene polymer battery separator	1,231.99	1,175.29	695.13	4.82%	77.23%	5,352	5,839	6,160	-8.34%	-13.12%
Propylene polymer battery separator	90.69	59.39	72.68	52.70%	24.78%	22,174	34,741	38,600	-36.17%	-42.55%
Artificial graphite	16,718.21	12,802.65	18,476.05	30.58%	-9.51%	976	949	830	2.83%	17.62%

Source: China Customs & CCM

Table 3: China's imports of major Li-ion batteries, Nov. 2016

Product	Volume, million unit					Price, USD/unit				
	Nov. 2016	Oct. 2016	Nov. 2015	MoM change	YoY change	Nov. 2016	Oct. 2016	Nov. 2015	MoM change	YoY change
Li-ion storage battery	145.73	135.52	144.19	7.53%	1.07%	1.80	1.83	2.10	-1.64%	-14.29%
Li-ion primary battery and primary battery pack	68.65	55.41	68.18	23.89%	0.69%	0.30	0.32	0.27	-6.25%	11.11%

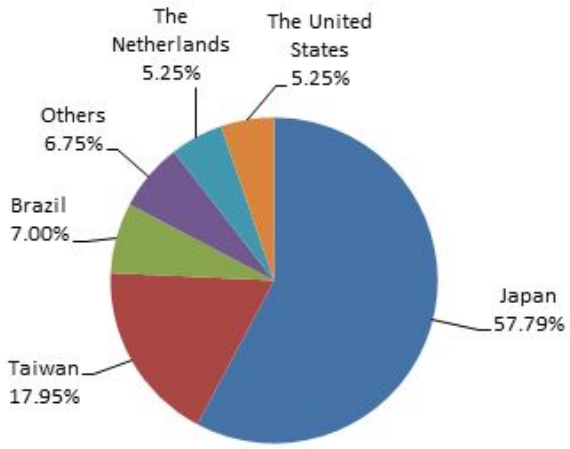
Source: China Customs & CCM

Table 4: China's exports of major Li-ion batteries, Nov. 2016

Product	Volume, million unit					Price, USD/unit				
	Nov. 2016	Oct. 2016	Nov. 2015	MoM change	YoY change	Nov. 2016	Oct. 2016	Nov. 2015	MoM change	YoY change
Li-ion storage battery	142.79	133.59	136.60	6.89%	4.53%	4.99	4.77	4.36	4.61%	14.45%
Li-ion primary battery and primary battery pack	99.36	129.88	116.43	-23.50%	-14.66%	0.26	0.24	0.24	8.33%	8.33%

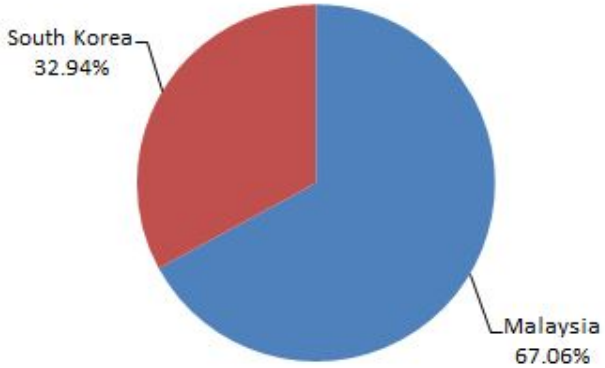
Source: China Customs & CCM

Figure 1: China's export destinations of lithium carbonate by volume, Nov. 2016



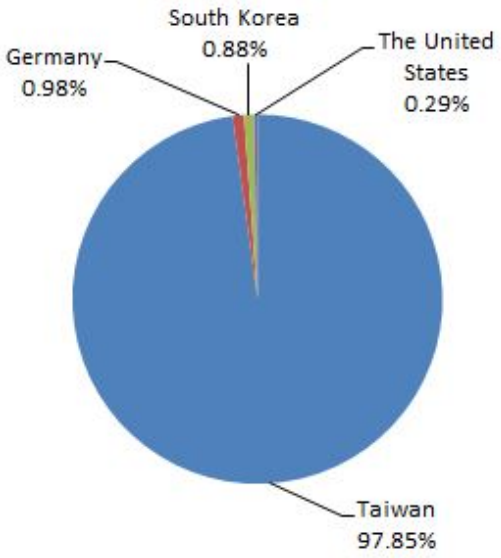
Source: China Customs & CCM

Figure 2: China's export destinations of lithium manganate by volume, Nov. 2016



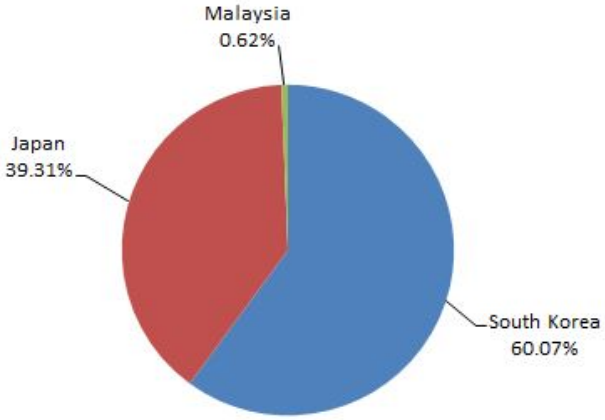
Source: China Customs & CCM

Figure 3: China's export destinations of lithium ferrous phosphate by volume, Nov. 2016



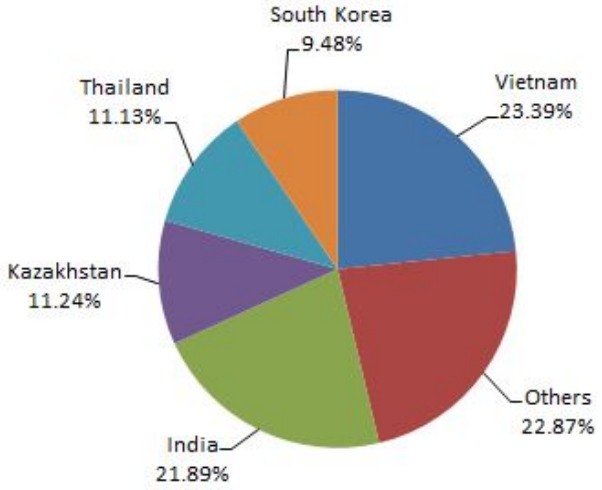
Source: China Customs & CCM

Figure 4: China's export destinations of lithium nickel cobalt manganate by volume, Nov. 2016



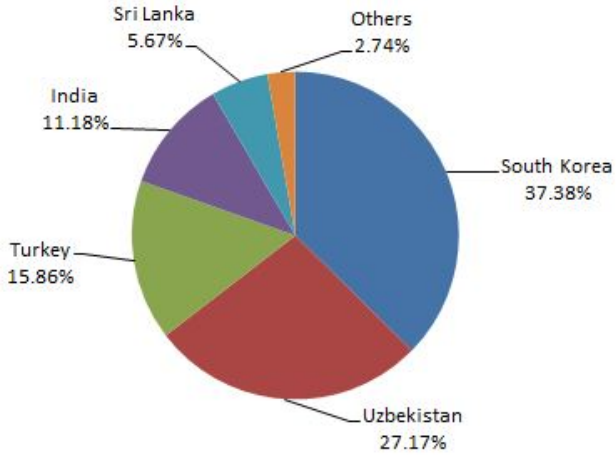
Source: China Customs & CCM

Figure 5: China's export destinations of ethylene polymer battery separator by volume, Nov. 2016



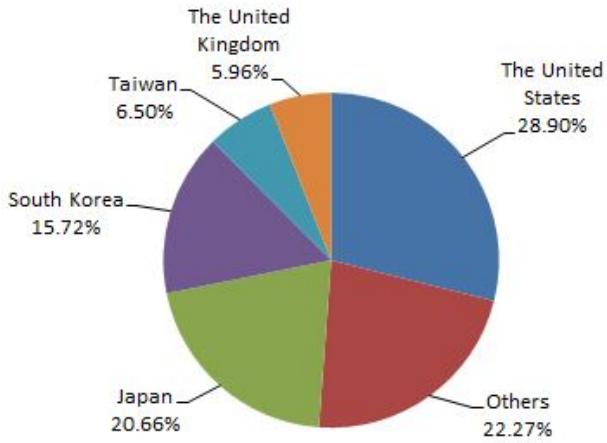
Source: China Customs & CCM

Figure 6: China's export destinations of propylene polymer battery separator by volume, Nov. 2016



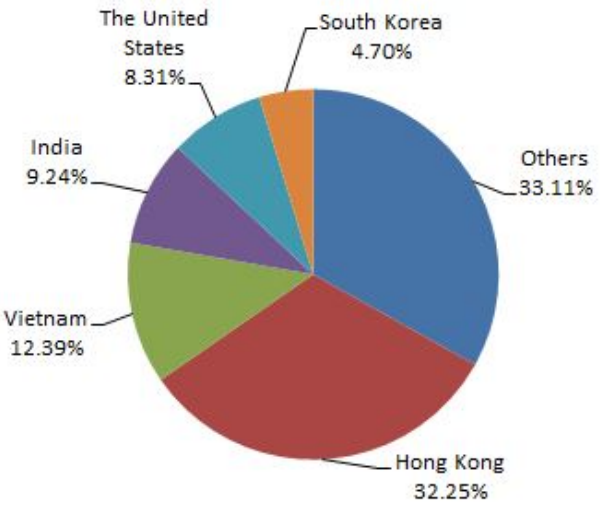
Source: China Customs & CCM

Figure 7: China's export destinations of artificial graphite by volume, Nov. 2016



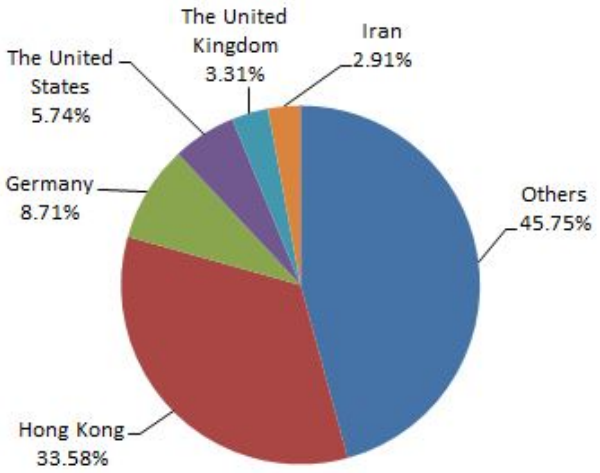
Source: China Customs & CCM

Figure 8: China's export destinations of Li-ion storage battery by volume, Nov. 2016



Source: China Customs & CCM

Figure 9: China's export destinations of Li-ion primary battery and primary battery pack by volume, Nov. 2016



Source: China Customs & CCM

Price Update

Ex-works prices of major Li-ion battery materials in China in Jan. 2017

Table 5: Ex-works prices of major Li-ion battery materials in China in Jan. 2017

Product	Ex-works price in Jan. 2017		Ex-works price in Dec. 2016		MoM change (USD)
	USD/t	RMB/t	USD/t	RMB/t	
Lithium carbonate (industrial grade)	**17,074**	118,658	**18,127**	125,000	-5.81%
Lithium carbonate (battery grade)	**19,082**	132,613	**19,287**	133,000	-1.07%
Lithium cobaltate (LCO)	**28,778**	200,000	**29,003**	200,000	-0.78%
Lithium manganate (power type)	**15,108**	105,000	**15,952**	110,000	-5.29%
Lithium manganate (energy storage type)	**22,303**	155,000	**22,477**	155,000	-0.78%
Lithium ferrous phosphate (LFP)	**22,303**	155,000	**22,477**	155,000	-0.78%
Lithium nickel cobalt manganate (111 type)	**10,072**	70,000	**10,151**	70,000	-0.78%
Lithium nickel cobalt manganate (523 type)	**10,072**	70,000	**10,151**	70,000	-0.78%
Electrolyte (for LMO, LFP and ternary cathode materials)	**11,655**	81,000	**11,746**	81,000	-0.78%
Anode materials (for power Li-ion battery)	**8,633**	60,000	**8,991**	62,000	-3.98%
Product	**Ex-works price in Jan. 2017**		**Ex-works price in Dec. 2016**		**MoM change (USD)**
	USD/m^2	**RMB/m^2**	**USD/m^2**	**RMB/m^2**	
Separator (wet process)	**0.65**	4.50	**0.73**	5.00	-10.70%
Separator (dry process)	**0.50**	3.50	**0.58**	4.00	-13.18%

Source: CCM

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