



# 首次评级 格林美 (002340.SZ)

中性

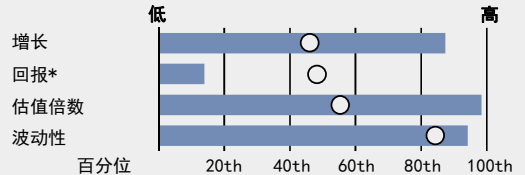
证券研究报告

## 在钴回收产业链上处于有利地位；首次覆盖并评为中性（摘要）

### 投资观点

格林美是一家领先的电池正极生产商及金属回收解决方案供应商。我们认为公司所处地位有利，能够受益于钴回收需求的日益增长以及未来几年的钴供应收紧，特别是在中国高度依赖钴进口且镍钴锰(NCM)/镍钴铝(NCA)电池需求旺盛的情况下。我们预计格林美 2015-18 年净利润的年均复合增长率为 62%，主要得益于公司电池材料和电子废弃物回收业务收入年均复合增长 42% 和 13%。我们对格林美的首次评级为中性，12 个月目标价格为人民币 6.9 元。

### 投资摘要



\* 回报 - 资本回报率 投资摘要指标的全面描述请参见本报告的信息披露部分。

### 主要增长动力

(1) 镍钴锰/镍钴铝正极和前驱体业务产能扩张并获得新的客户。我们预计格林美的镍钴锰正极材料、镍钴锰正极前驱体以及镍钴铝正极前驱体产能将从 2015 年时的 1.5 万吨升至 2018 年的 5.6 万吨。格林美是中国仅有的几家镍钴铝正极前驱体生产企业之一。(2) 电子废弃物回收业务的销售收入和利润率回升。我们认为耐用消费品行业将在 2016-21 年步入置换高峰期。我们预计 2016-21 年耐用消费品回收相关收入的年均复合增长率将超过 20%。此外，我们预计行业整合也将令格林美受益，为毛利率带来提振。

### 风险

上行风险：镍钴锰/镍钴铝正极/前驱体需求高于预期。下行风险：营运资金周期紧张；政府补贴推迟给付。

### 估值

我们对格林美的 12 个月目标价格为人民币 6.9 元，基于 26 倍市盈率（海外领先电池企业的长期行业均值）乘以公司 2020 年每股盈利预测，再以 7.3% 的资本成本进行贴现。

### 行业背景

2015 年中国消费在全球总需求中占比 49%，但产量占比仅为 6%。

\*全文翻译随后提供

### 所属投资名单

中性

### 行业评级：中性

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+86(21)2401-8925 frank.he@ghsl.cn 北京高华证券有限责任公司

### 主要数据

当前	
股价 (Rmb)	6.31
12个月目标价格 (Rmb)	6.90
市值 (Rmb mn / US\$ mn)	18,367.6 / 2,669.4
外资持股比例 (%)	--

	12/15	12/16E	12/17E	12/18E
每股盈利 (Rmb)	0.13	0.09	0.17	0.22
每股盈利增长 (%)	(48.2)	(26.6)	80.2	31.0
每股摊薄盈利 (Rmb)	0.15	0.09	0.17	0.22
每股基本盈利 (Rmb)	0.13	0.09	0.17	0.22
市盈率 (X)	53.9	66.5	36.9	28.2
市净率 (X)	1.3	2.7	2.5	2.3
EV/EBITDA (X)	16.9	27.4	20.3	17.6
股息收益率 (%)	0.3	0.0	0.0	0.0
净资产回报率 (%)	3.2	4.1	7.0	8.5
CROCI (%)	11.8	2.3	3.6	4.1

### 股价走势图



### 股价表现 (%)

	3个月	6个月	12个月
绝对	(11.6)	(18.8)	24.2
相对于沪深300指数	(11.9)	(22.4)	8.8

资料来源：公司数据、高盛研究预测、FactSet（股价为2/08/2017收盘价）

北京高华证券有限责任公司及其关联机构与其研究报告所分析的企业存在业务关系，并且继续寻求发展这些关系。因此，投资者应当考虑到本公司可能存在可能影响本报告客观性的利益冲突，不应视本报告为作出投资决策的唯一因素。有关分析师的申明和其他重要信息，见信息披露附录，或请与您的投资代表联系。

## 格林美：财务数据概要

损益表(Rmb mn)	12/15	12/16E	12/17E	12/18E	资产负债表(Rmb mn)	12/15	12/16E	12/17E	12/18E
主营业务收入	5,117.2	6,929.2	8,970.9	10,697.3	现金及等价物	1,590.2	1,293.6	1,155.0	859.3
主营业务成本	(4,240.9)	(5,848.0)	(7,431.0)	(8,825.3)	应收账款	1,773.4	2,278.1	2,949.3	3,516.9
销售、一般及管理费用	(390.5)	(478.1)	(619.0)	(727.4)	存货	2,778.3	3,204.4	3,868.2	4,352.2
研发费用	--	--	--	--	其它流动资产	1,615.9	1,664.4	1,714.3	1,765.8
其它营业收入/(支出)	(11.6)	(10.0)	(10.0)	(10.0)	<b>流动资产</b>	<b>7,757.8</b>	<b>8,440.4</b>	<b>9,686.9</b>	<b>10,494.1</b>
<b>EBITDA</b>	<b>774.9</b>	<b>910.9</b>	<b>1,308.8</b>	<b>1,585.7</b>	固定资产净额	3,617.2	4,509.3	4,921.5	5,280.3
折旧及摊销	(300.8)	(317.8)	(397.8)	(451.2)	无形资产净额	1,257.0	1,247.0	1,237.0	1,227.0
<b>EBIT</b>	<b>474.2</b>	<b>593.1</b>	<b>911.0</b>	<b>1,134.6</b>	长期投资	51.8	51.8	51.8	51.8
利息收入	7.7	15.9	12.9	11.6	其它长期资产	3,255.5	3,255.5	3,581.1	3,939.2
财务费用	(275.0)	(312.2)	(379.7)	(435.9)	<b>资产合计</b>	<b>15,939.3</b>	<b>17,504.1</b>	<b>19,478.3</b>	<b>20,992.5</b>
联营公司	0.0	0.0	0.0	0.0	应付账款	935.9	1,281.7	1,628.7	1,934.3
其它	41.9	55.0	85.0	96.0	短期贷款	3,462.6	3,462.6	3,462.6	3,462.6
<b>税前利润</b>	<b>248.7</b>	<b>351.8</b>	<b>629.2</b>	<b>806.2</b>	其它流动负债	1,762.5	1,205.3	835.1	392.3
所得税	(30.1)	(45.7)	(81.8)	(104.8)	<b>流动负债</b>	<b>6,160.9</b>	<b>5,949.6</b>	<b>5,926.4</b>	<b>5,789.2</b>
少数股东损益	(64.4)	(30.0)	(50.0)	(50.0)	长期贷款	2,724.8	4,224.8	5,724.8	6,724.8
<b>优先股股息前净利润</b>	<b>154.2</b>	<b>276.1</b>	<b>497.4</b>	<b>651.4</b>	其它长期负债	270.3	270.3	270.3	270.3
优先股息	0.0	0.0	0.0	0.0	长期负债	2,995.1	4,495.1	5,995.1	6,995.1
<b>非经常性项目前净利润</b>	<b>154.2</b>	<b>276.1</b>	<b>497.4</b>	<b>651.4</b>	<b>负债合计</b>	<b>9,156.0</b>	<b>10,444.7</b>	<b>11,921.4</b>	<b>12,784.2</b>
税后非经常性损益	21.0	0.0	0.0	0.0	<b>优先股</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>净利润</b>	<b>175.2</b>	<b>276.1</b>	<b>497.4</b>	<b>651.4</b>	<b>普通股权益</b>	<b>6,561.7</b>	<b>6,837.8</b>	<b>7,335.2</b>	<b>7,986.6</b>
每股基本盈利(非经常性项目前)(Rmb)	0.13	0.09	0.17	0.22	少数股东权益	221.6	221.6	221.6	221.6
每股基本盈利(非经常性项目后)(Rmb)	0.15	0.09	0.17	0.22	<b>负债及股东权益合计</b>	<b>15,939.3</b>	<b>17,504.1</b>	<b>19,478.3</b>	<b>20,992.5</b>
每股摊薄盈利(非经常性项目后)(Rmb)	0.15	0.09	0.17	0.22	<b>每股净资产(Rmb)</b>	<b>5.50</b>	<b>2.35</b>	<b>2.52</b>	<b>2.74</b>
每股股息(Rmb)	0.02	0.00	0.00	0.00					
股息支付率(%)	13.6	0.0	0.0	0.0					
自由现金流收益率(%)	(21.1)	(9.7)	(8.8)	(7.0)					
<b>增长率和利润率(%)</b>	<b>12/15</b>	<b>12/16E</b>	<b>12/17E</b>	<b>12/18E</b>	<b>比率</b>	<b>12/15</b>	<b>12/16E</b>	<b>12/17E</b>	<b>12/18E</b>
主营业务收入增长率	30.9	35.4	29.5	19.2	CROCI (%)	11.8	2.3	3.6	4.1
EBITDA增长率	20.0	17.6	43.7	21.2	净资产回报率(%)	3.2	4.1	7.0	8.5
EBIT增长率	16.3	25.1	53.6	24.5	总资产回报率(%)	1.3	1.7	2.7	3.2
净利润增长率	(24.3)	57.6	80.2	31.0	平均运用资本回报率(%)	4.5	4.5	6.0	6.5
每股盈利增长	(46.3)	(35.4)	80.2	31.0	存货周转天数	216.1	186.7	173.7	170.0
毛利率	17.1	15.6	17.2	17.5	应收账款周转天数	106.0	106.7	106.3	110.3
EBITDA利润率	15.1	13.1	14.6	14.8	应付账款周转天数	77.1	69.2	71.5	73.7
EBIT利润率	9.3	8.6	10.2	10.6	净负债/股东权益(%)	67.8	90.6	106.3	113.6
					EBIT利息保障倍数(X)	1.8	2.0	2.5	2.7
<b>现金流量表(Rmb mn)</b>	<b>12/15</b>	<b>12/16E</b>	<b>12/17E</b>	<b>12/18E</b>	<b>估值</b>	<b>12/15</b>	<b>12/16E</b>	<b>12/17E</b>	<b>12/18E</b>
优先股股息前净利润	154.2	276.1	497.4	651.4	基本市盈率(X)	53.9	66.5	36.9	28.2
折旧及摊销	300.8	317.8	397.8	451.2	市净率(X)	1.3	2.7	2.5	2.3
少数股东权益	64.4	30.0	50.0	50.0	EV/EBITDA(X)	16.9	27.4	20.3	17.6
运营资本增减	(1,029.2)	(584.9)	(988.1)	(746.0)	企业价值/总投资现金(X)	1.4	2.1	1.9	1.7
其它	211.1	(635.7)	(795.7)	(902.3)	股息收益率(%)	0.3	0.0	0.0	0.0
<b>经营活动产生的现金流</b>	<b>(298.7)</b>	<b>(596.7)</b>	<b>(838.5)</b>	<b>(495.8)</b>					
资本开支	(1,498.6)	(1,200.0)	(800.0)	(800.0)					
收购	0.0	0.0	0.0	0.0					
剥离	0.0	0.0	0.0	0.0					
其它	(1,026.7)	0.0	0.0	0.0					
<b>投资活动产生的现金流</b>	<b>(2,525.4)</b>	<b>(1,200.0)</b>	<b>(800.0)</b>	<b>(800.0)</b>					
支付股息的现金(普通股和优先股)	(29.1)	0.0	0.0	0.0					
借款增减	958.0	1,500.0	1,500.0	1,000.0					
普通股发行(回购)	2,177.6	0.0	0.0	0.0					
其它	154.4	0.0	0.0	0.0					
<b>筹资活动产生的现金流</b>	<b>3,260.8</b>	<b>1,500.0</b>	<b>1,500.0</b>	<b>1,000.0</b>					
<b>总现金流</b>	<b>436.7</b>	<b>(296.7)</b>	<b>(138.5)</b>	<b>(295.8)</b>					

注：最后一个实际年度数据可能包括已公布和预测数据。

资料来源：公司数据、高盛研究预测

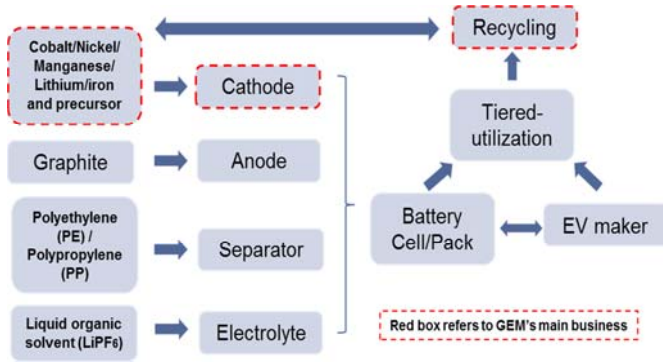
## 对此报告有贡献的人员

何方

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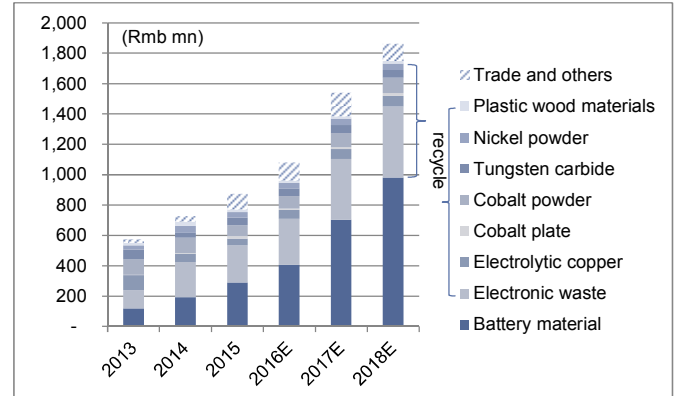
# Our thesis in six charts

**Exhibit 1: GEM value chain position**



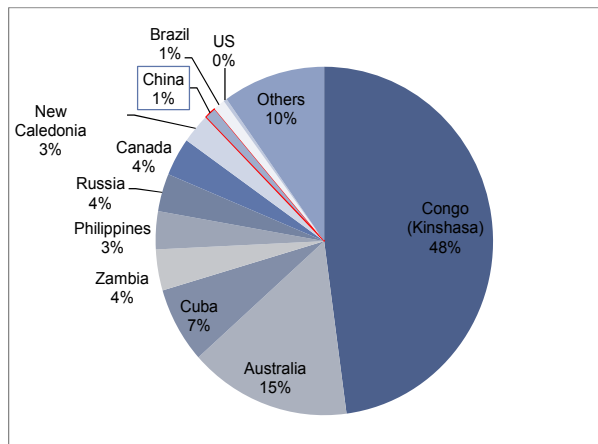
Source: Company data, Gao Hua Securities Research

**Exhibit 2: Battery to contribute over 50% of 2018E GP**  
Gross profit breakdown



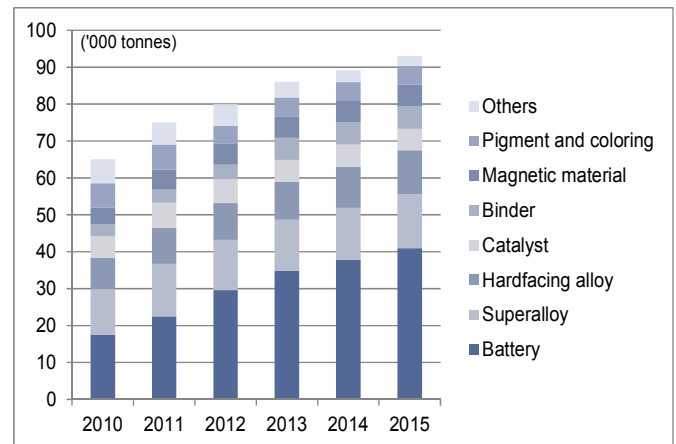
Source: Company data, Gao Hua Securities Research

**Exhibit 3: China only owns 1% of global cobalt reserves**  
Global cobalt reserve by country



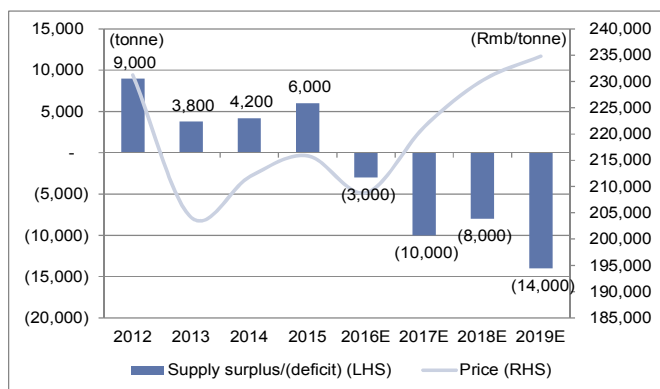
Source: USGS, Gao Hua Securities Research

**Exhibit 4: Batteries is the major cobalt demand driver**  
Global cobalt demand by application



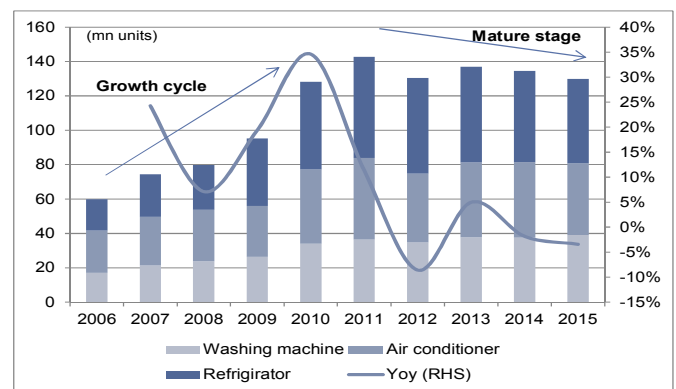
Source: Zwzyzx.com, Gao Hua Securities Research

**Exhibit 5: Cobalt may be in shortage in the coming years**  
Global cobalt surplus/deficit vs. cobalt price



Source: CRU, Gao Hua Securities Research

**Exhibit 6: White goods consumption peaked in 2011**  
Annual shipment of white goods



Source: WIND, Gao Hua Securities Research

# The Battery Challenge

To learn more about the battery challenge in China, read our thematic report below or listen to the audio summary. Visit our theme pages for related works on The Great Battery Race, Cars: The Road Ahead, The Low Carbon Economy and Advanced Materials.



China's Battery Challenge: A new solution to a growth problem

(Audio summary)



Charging the future: Asia leads drive to next-gen EV battery market, Sep 27, 2016

The Great Battery Race, Oct 18, 2015



Lighter, Faster, Cheaper, Apr 7, 2016

Disruption in China's new car market, Feb 29, 2016



Technology in the Driver's Seat, Nov 28, 2016

Electric Vehicles – customer acceptance & continued scaling; check, Apr 7, 2016



Profiles in Innovation: Advanced Materials—Faster, Stronger, Smaller, Lighter, Sep. 27, 2016

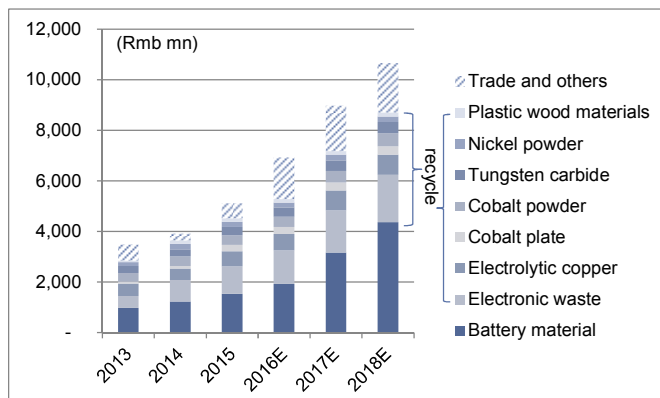
## Our investment view

### An integrated battery material and recycling solution provider

GEM is a leading battery material producer and metal recycling solution provider. One of the largest metal recycling companies in China, GEM accounts for 10% of China's battery recycling and captures 15% and 20% shares in consumer durables and printed circuit board recycling, respectively. It is one of the top three cobalt refining companies in China with annual processing volume of 15,000 tonnes in 2015, representing 33% market share. GEM entered the LCO battery cathode material business in 2012 through its acquisition of Jiangsu Cobalt Nickel Metal (KLK) and has captured close to 30% market share in cobalt oxide (Co3O4). Meanwhile GEM has recently begun the process of ramping up its NCM/NCA cathode and precursor materials recently.

**Exhibit 7: We expect battery material to drive the overall revenue growth ahead**

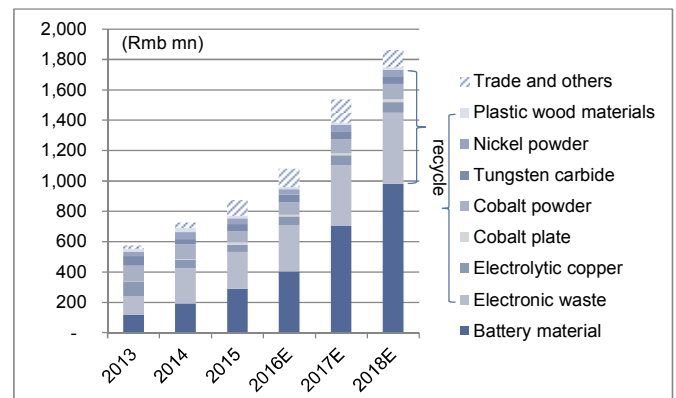
Revenue breakdown



Source: Company data, Gao Hua Securities Research

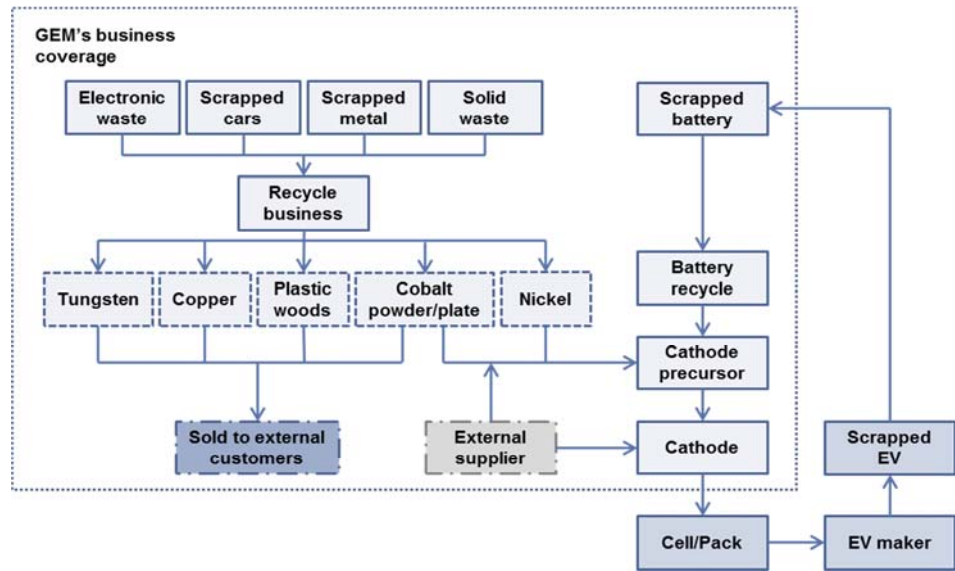
**Exhibit 8: We expect battery will account for over 50% of its total gross profit in 2018E, vs. 21% in 2013**

Gross profit breakdown



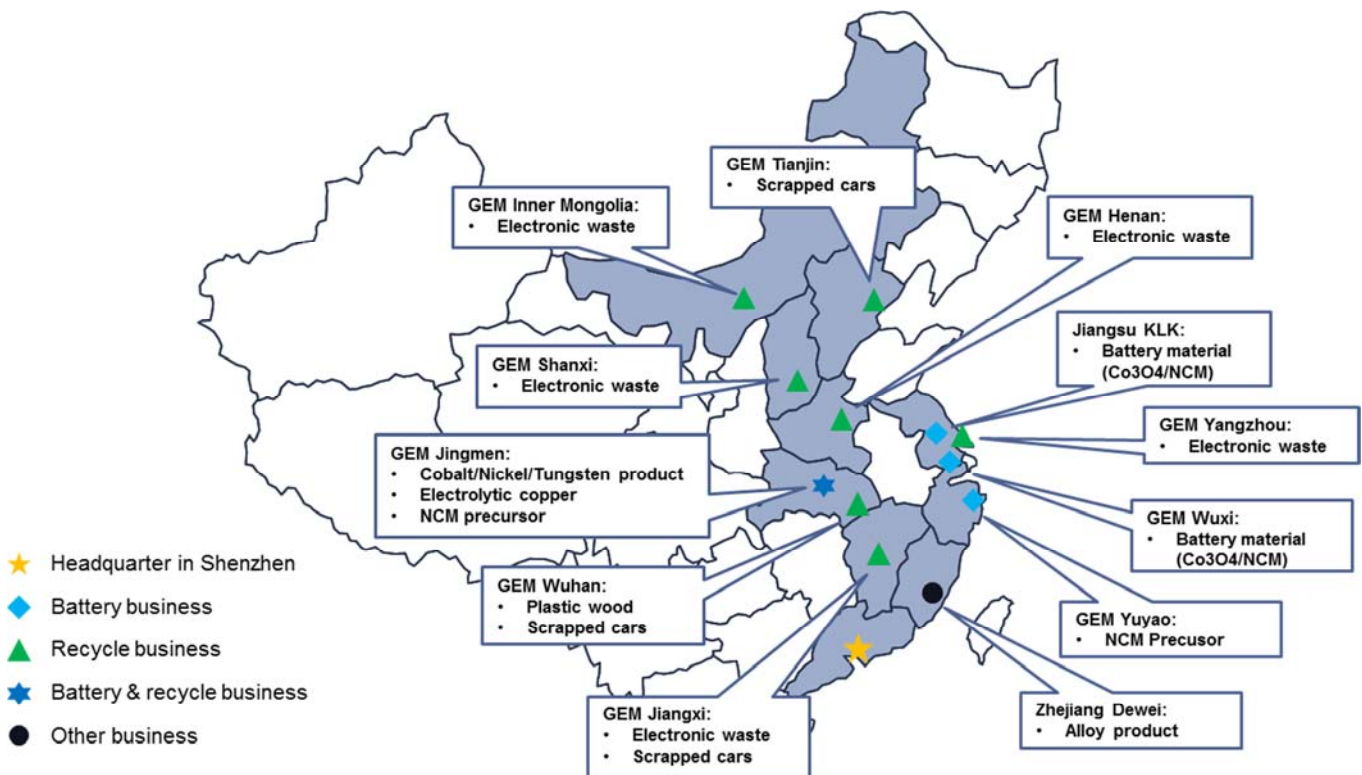
Source: Company data, Gao Hua Securities Research

**Exhibit 9: GEM has a well-established business model in recycling industry**  
Business model illustration of GEM



Source: Company data, Gao Hua Securities Research

**Exhibit 10: GEM has eight recycling bases, four battery plants and one alloy product center across China**  
Map of GEM's key production centers



Source: Company data

### Strategic positioning in cobalt resources

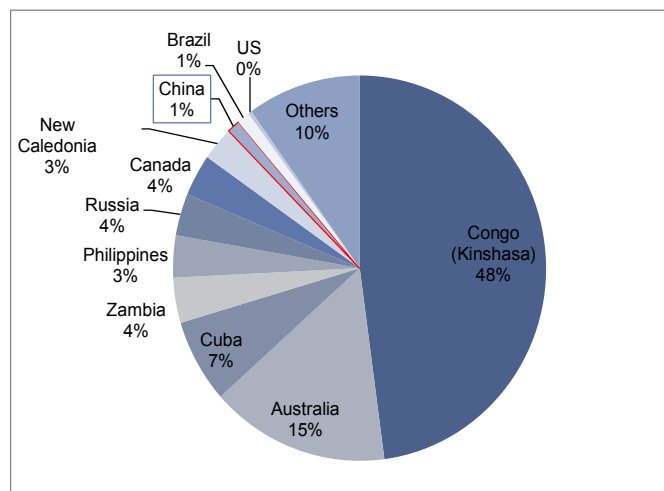
**We see synergy between GEM's recycling and battery material business.** GEM processes 15,000 tonnes cobalt annually, which represents 33% of China's 2015 cobalt consumption. 30%-40% of GEM cobalt is sourced from recycling from scrap metals and batteries, with the remaining mainly from upstream mining companies such as Glencore, etc. We believe recycling business provides critical raw material supply for GEM's battery material business. Meanwhile, its battery material business creates a new sales channel for its recycling business, enabling GEM to climb up the value chain by capturing a higher-margin segment. GEM indicates the gross margin for NCM cathode is around 25% while that for precursors and cobalt powder is 20% and 15%-18%, respectively.

**Cobalt recycling is a growing critical source of cobalt supply.** We believe EV battery is becoming the key demand driver for cobalt in the coming years. We believe cobalt recycling will become a more critical role in facilitating EV battery demand growth in China, mainly due to the following reasons.

China accounts for 49% of global cobalt demand in 2015 (mainly due to large refining capacity), but it captures only 6% market share in production and 1% of reserves worldwide. This suggests a heavy reliance on imports for Chinese cobalt refiners. In addition, Cobalt supply is quite concentrated, with the Democratic Republic of Congo (Kinshasa) controlling 51% global supply in 2015 and 48% of reserves. Moreover, cobalt resource is not as sufficient as other metals. It is treated by European Union as one of the four metals in the short list among 40 critical metals. In the United States during 2014, 27% of cobalt consumption was for scrap metals containing cobalt. We expect the Chinese government, in order to reduce reliance on imports, will promote the development of efficient and low-cost cobalt recycling from retired EV batteries. Therefore, given that GEM is one of the top three cobalt recycling companies in China, we believe it is well positioned to benefit from this trend.

**Exhibit 11: Although China captures only a 1% share of global cobalt reserves...**

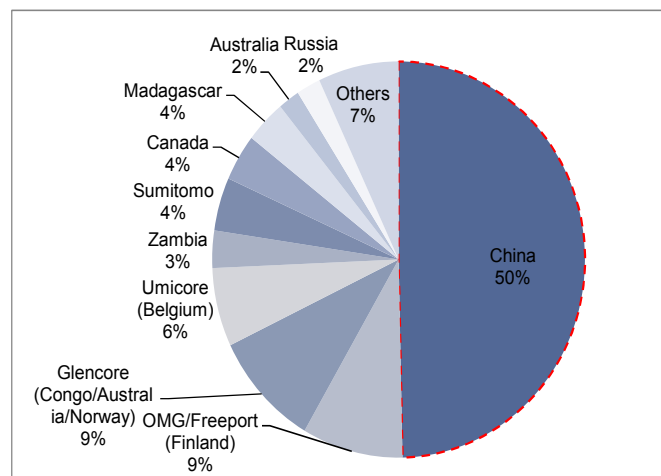
Global cobalt reserve by country



Source: USGS. Gao Hua Securities Research

**Exhibit 12: ...China accounts for 50% of global cobalt refining demand**

Cobalt refining demand by country



Source: USGS. Gao Hua Securities Research

### Cobalt will enter a supply shortage cycle in 2017-19

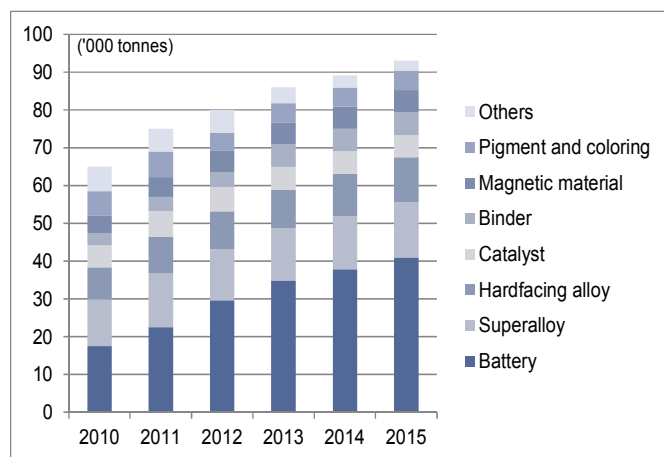
Cobalt price spiked in 2007-08 and reached a record high of US\$106/kg in February 2016, primarily driven by strong demand pickup and a muted new supply. Due to oversupply, it experienced sequential downcycles in 2H08-1H16. Thanks to demand from EV batteries, cobalt price started to rebound in 3Q16. All kinds of batteries accounted for 44% and 77% of global and China's cobalt demand in 2015. We estimate cobalt demand will register a 6% CAGR in 2016-19 and the EV-related demand contribution will increase from 5% in 2016 to 12% in 2019. CRU also forecast cobalt consumption will exceed 100,000 tonnes in 2016 and will increase 68% during 2015-25. Apart from batteries, cobalt is also mainly used in metallurgical applications to form super alloys used in aero-engines and hard-facing alloys used in the drilling and molding industry, as well as permanent magnets used in wind turbines, among others.

On the supply side, cobalt is primarily a by-product of copper and nickel mining as 60% of cobalt production comes from copper mining, 38% from nickel operations and only 2% from primary cobalt mines. That said, cobalt supply is mainly linked to copper and nickel's supply dynamics. Our commodity team believes copper supply and demand is highly price inelastic and forecasts copper supply will decline 0.4% yoy in 2017, followed by a 3.4%/2.6% yoy increase in 2018/19E. This expectation for a yoy supply decline in 2017 is due to the fact that 13% of the copper supply has associated labor contract negotiation during 2017, with 9% of contracts expiring in 1Q17. Moreover, in August 2015, Glencore suspended its Katanga Mining (Copper and Cobalt) in Congo for 18 months to build lower-cost processing facilities, which represents 26% of the country's copper output in 2014. For nickel, our commodity team projects supply to increase by 2% and 6% in 2017/18E. Therefore, we believe cobalt supply will face tight supply in the coming years.

**We believe the upward trend in the cobalt price favors GEM as it takes around six months for the company to source cobalt mine/scrap metal and process it into final cobalt powder and cathode materials.**

**Exhibit 13: Batteries represent the major cobalt demand driver**

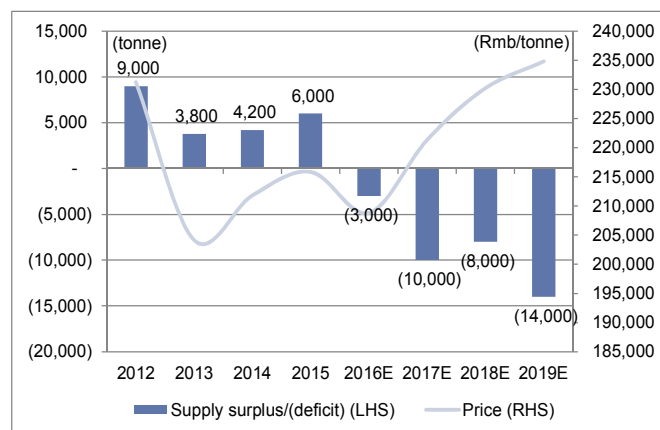
Global cobalt demand by application



Source: Zwyzx.com, Gao Hua Securities Research

**Exhibit 14: Cobalt is likely to be in shortage in the coming years**

Global cobalt surplus/deficit vs. cobalt price



Source: CRU, Gao Hua Securities Research

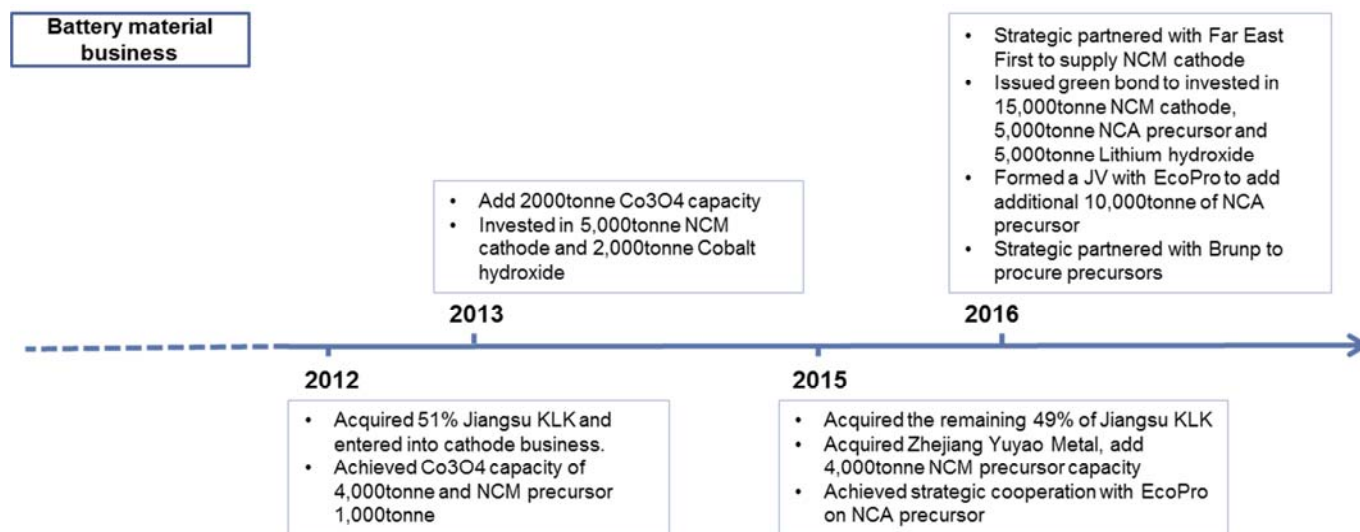
### Evolving from LCO to NCM/NCA cathode materials

**Strong presence in LCO cathode material.** GEM (KLK) initially became involved in the production of cobalt oxide (Co3O4) material, which is used in LCO batteries. It sequentially extended the business footprint to NCM cathode precursor in 2015 and NCM cathode in 2016. According to GEM, its Co3O4 customers include Samsung SDI, PULead Technology, Citic

Guoan, Tianjin Bamo Tech, and Hunan Shanshan, etc. We estimate its Co<sub>3</sub>O<sub>4</sub> sales volume is over 11,000 tonnes in 2015, which represents 29% market share in China, with major competitors including Jinchuan Group and Huayou Cobalt.

### Exhibit 15: GEM has established an integrated value chain along with cathode material since 2012

Key initiatives of battery material business in GEM



Source: Company data

**Ramping up NCM/NCA presence with robust orders on hand.** Although GEM does not have a long track record in ternary material manufacturing, it leverages on its expertise and R&D team, which originated from AGC Seimi Chemical. KLK acquires the full ownership of its joint venture with AGC Seimi Chemical in Wuxi in 2014, including intellectual properties and imported equipment from Japan, etc.

As at December 2016, GEM has built 10,000 tonnes NCM precursor and 10,000 tonnes NCM cathode capacity. In addition, GEM is also in the process of building 5,000 tonnes of NCA cathode precursor capacity currently that is scheduled to begin commercial operation in 2017. GEM is one of the few companies in China with the ability to manufacture NCA precursor. We expect its NCM cathode, NCM precursor and NCA precursor capacity will reach 15,000, 20,000 and 5,000 tonnes. Its current NCM customers mainly include ATL, Lishen, Coslight, Tianneng, etc.

In 2016, the company has secured a few sales contracts the ternary material business, thus providing sales visibility in 2017-18E. Its customers include Tianjin EV Energies and Far East First New Energy for NCM cathodes, and 10,000 tonnes NCM precursor with Hunan Brunp Recycling (see Exhibit 16). Since Brunp is a subsidiary of CATL, the strategic cooperation with Brunp enables GEM to enter the supply chain of CATL. Moreover, GEM has also entered into a framework contract with ECOPRO, a leading cathode supplier in Korea, to jointly invest US\$10 mn in Pohang in Korea to build an NCM/NCA cathode facility and build 5,000 tonnes NCA precursor capacity in China in 2017. ECOPRO is the unique NCA cathode material external supplier for Samsung SDI. We believe the strategic partnership will enhance GEM's competitiveness in NCA.



### Exhibit 16: GEM has successfully secured some large NCM cathode/precursor orders in 2016, enhancing sales visibility in 2017

Major NCM cathode/precursor contracts secured in 2016

Date	Customer	Contract size (Rmb mn/year)	Product	Target sales volume (tonnes)			Key end customers
				2016	2017	2018	
Jan-16	Tianjin EV Energies	770	NCM cathode	680	1,500	3,000	Dongfeng, Chery, Chang An, Zhongtai
Jan-16	Far East First	450	NCM cathode	3,000			Zhongtai, Shaanxi Auto
Oct-16	Hunan Brunp	700	NCM precursor	over 10,000/year			CATL

Source: Company data

### Exhibit 17: GEM has NCM/NCA cathode/precursor capacity under construction

Capacity expansion plan

Product	Capacity (tonnes)	Capex (Rmb mn)	Target (Rmb mn)		Payback period (years)
			Revenue	Net profit	
NCA precurosor	5,000	105.5	330	35.2	5.68
NCM cathode	10,000	235.0	1,000	86.9	6.48
NCM precursor	10,000	316.0	690	65.7	7.32
<b>Total</b>		<b>656.5</b>	<b>2,020</b>	<b>187.8</b>	
	<b>2014</b>	<b>2015</b>	<b>2016E</b>	<b>2017E</b>	<b>2018E</b>
Co3O4	6,000	10,000	10,000	10,000	11,000
NCM cathode	-	-	10,000	15,000	15,000
NCM precursor	1,000	5,000	10,000	15,000	20,000
NCA precursor	-	-	-	5,000	5,000

Source: Company data, Gao Hua Securities Research

## Recycling business: Robust growth with margin rebound potential

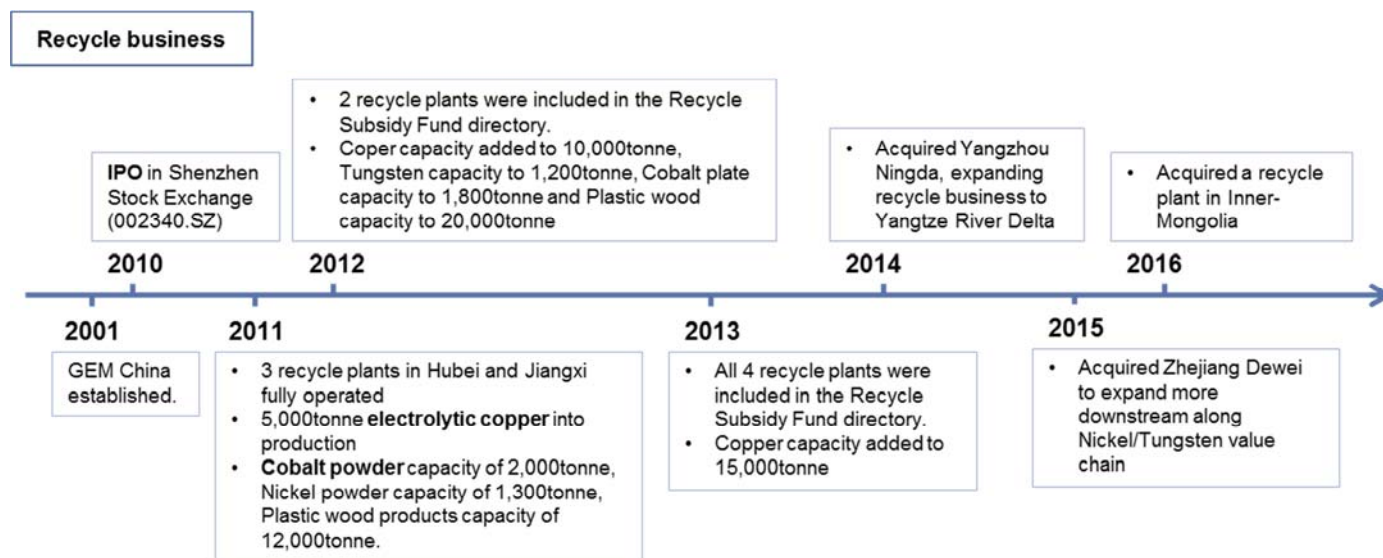
GEM commenced R&D for the material recycling business in 2002, has accumulated abundant experience in the recycling business, and has built 12 recycling industrial zones across China, covering various recyclable materials such as batteries, electronic devices, consumer durables, scrap metals, automobiles, and solid waste, etc. Its major products include cobalt powder/plate, nickel, cooper, tungsten, and plastic woods, among others.

While there are a number of small-sized recycling companies in China, **GEM has the leading position among peers in terms of scale, processing know-how, product quality and environmental preservation standard, etc.**

**Leading scale:** GEM owns China's largest nickel and cobalt fine powder production center and accounts for 60% of China's cobalt powder supply. Its recycled nickel and tungsten is equivalent to a mid-single digit percentage of China's production. The company also processes over 10% of China's recycled batteries and captures 15% and 20% shares in consumer durables and printed circuit board recycling, respectively.

**Exhibit 18: GEM has established an extensive business portfolio in recycling business across China since 2001**

Key initiatives of GEM's recycling business



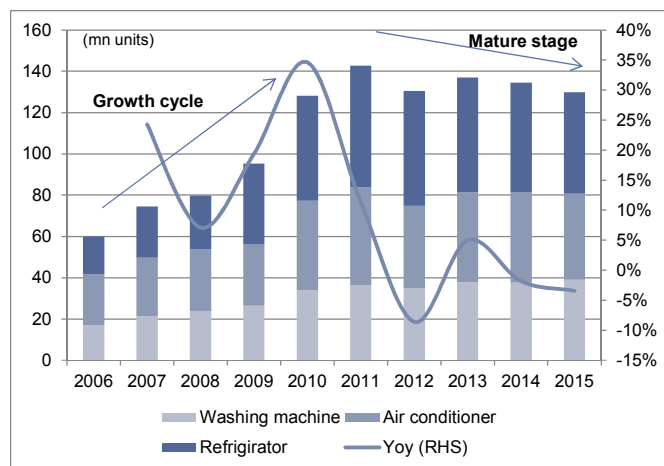
Source: Company data

**Advanced know-how:** Unlike extracting metals from raw ores, the content mix of discarded goods is more complicated and varies by product type. This requires more sophisticated product design to effectively separate and purify materials and recover them through different chemical reactions. Another technical entry barrier is to reactivate the properties of the recycled metals. GEM has applied for over 500 patents and is the first Chinese company to register patents in Europe and the US.

**Ample growth potential for electronic good recycling in 2016-2021.** The electronics recycling industry kicked off in 2009 when the Chinese government implemented its "Replacing Old for New" program for devices such as air conditioners, refrigerators, washing machines and computers. Demand for the three main white goods (PC/washers/refrigerators are the three main white goods) has increased from 60mn units in 2006 to the peak of 143mn units in 2011 (19% CAGR in 2006-2011) and entered the mature stage in 2011-16. Since the average duration for white goods is generally around 10 years, we believe there is growing replacement demand in 2016-2021. Therefore, this creates ample growth opportunity for recycling companies. In addition, personal computers is another major area of opportunity as the annual demand in 2015 57mn units in 2015 and its lifecycle is about five years. We estimate the annual recycled electronics device accounts for 60%-70% of the total. Coupled with the increase in recycling penetration, we expect consumer durable related recycling sales will increase by over a CAGR of 20% in 2016-2021. GEM indicates China's annual discarded electronic devices amounted to 6.5mn tonnes in 2015 and the total metal value from the recycling was around Rmb38bn. The government provides subsidies to recycling companies: Rmb80/unit for refrigerators, Rmb35-45/unit for washing machines, Rmb130/unit for air conditioners and Rmb70/unit for personal computers.

**Exhibit 19: White goods consumption reached a peak in 2011**

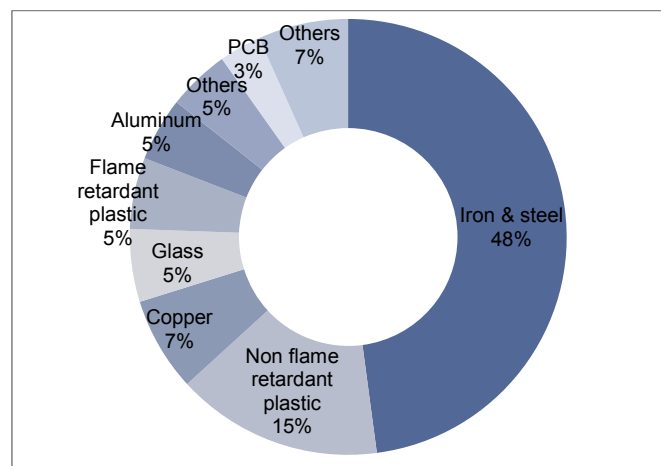
Annual shipment of white goods



Source: Wind, Gao Hua Securities Research

**Exhibit 20: There are various material components used in electronic devices**

Material component breakdown for electronic devices



Source: Company data

**Industry consolidation supports margin recovery.** GEM's recycling material margin has declined since 2011, mainly due to: (1) the downcycle of commodity prices in the past few years as its procurement cost is generally set at 60%-70% of the spot metal price based on the individual type of scrap goods; and (2) intense competition from smaller recycling mills. The scrap material collection channel is quite fragmented, with a number of small local smelting mills that has limited environmental preservation facility and low technical know-hows. For example, there are over 700 chemical ingredients in a typical PC, over 300 of which is hazardous to human being, such as lead, cadmic, mercury, etc. Those toxic materials will enter the earth and river and thus damage the environment

As the government is implementing more stringent environmental standards and measurements to control pollution, we note a number of recycling mills in Guangdong have been shut down or streamlined since 2015. We believe the ongoing industry consolidation will continue and thus favor leading players such as GEM with strong technical processing know-how and the ability to fund abundant capital platforms to meet higher environmental standards. On the other hand, GEM is expanding its recycling network through both organic growth and acquisitions. In July 2015, the company launches its online discarded good collection platform called "Hui Shou Ge", thus creating an online to offline (O2O) ecosystem. Moreover, GEM has established a strong presence in central and eastern provinces acquires recycling projects in western and northern regions, including the acquisition of projects in Inner Mongolia and Guizhou in 2015.

**Exhibit 21: GEM has industry leading recycling technology among peers**

Peers comparison for major recycling companies

Company	Raw material	Key processing features	Final product	Technology
Jiangxi Xuanheng	Nickel scrap	Separation, pyrometallurgy	Low end Nickel alloy	Entry level recycle
Shenzhen Hengyuantai	Nickel / cobalt scrap	Separation, crushing	Scrap nickel and cobalt	Entry level recycle
GEM China	Nickel / cobalt scrap, battery, electronics	Separation, purification reactivation	Fine cobalt powder/plate, nickel powder	Advanced recycle with registered patent
Batrec (Switzerland)	Battery	Separation, purification	Nickel/cobalt plate	Advanced recycle Industry leading position
Kansai Catalyst (Japan)	Nickel / cobalt scrap	Separation, purification	Fine nickel powder Cobalt oxide	Advanced recycle Industry leading position

Source: Company data, Gao Hua Securities Research

## Earnings and valuation

We project GEM to achieve a 62% net profit CAGR in 2015-2018E, driven by cathode/precursor capacity expansion and sales/margin recovery on electronic waste recycling. We forecast the cathode business to realize a 50% gross profit CAGR during 2015-18E, led by 55% sales growth. In addition, we forecast the electronic waste business to achieve a 17% CAGR in 2015-2020, driven by a 13% CAGR in sales in 2016-2020, due to the consumer durable peak cycle. We see a margin expansion opportunity in the coming years as environmental standards are rising.

**Exhibit 22: We expect capacity expansion in cathode/precursor business and sales in electronic waste recycling will drive earnings growth for GEM**

Key earnings driver assumptions

Battery material	2015	2016E	2017E	2018E
<b>Capacity (tonne)</b>	-	-	-	-
<b>Co3O4 - LCO</b>	<b>10,000</b>	<b>10,000</b>	<b>10,000</b>	<b>11,000</b>
<b>Ternary material</b>	<b>5,000</b>	<b>20,000</b>	<b>40,000</b>	<b>45,000</b>
NCM cathode	-	10,000	15,000	15,000
NCM precursor	5,000	10,000	15,000	20,000
NCA precursor	-	-	10,000	10,000
<b>Total</b>	<b>15,000</b>	<b>30,000</b>	<b>50,000</b>	<b>56,000</b>
Sales volume (tonne)	12,644	21,608	41,840	67,077
Revenue (Rmb mn)	1,529	1,933	3,167	4,412
Gross profit (Rmb mn)	291	407	704	992
Gross margin	19%	21%	22%	22%
<b>Recycling business</b>				
<b>Sales volume</b>				
Electronic waste (mn units)	8.5	11.1	13.3	15.6
Cobalt powder (tonne)	1,995	2,234	2,413	2,558
Nickel powder (tonne)	1,884	2,072	2,217	2,350
Electrolytic copper (tonne)	17,482	20,979	24,125	25,573
Tungsten product (tonne)	2,593	3,111	3,578	3,793
Cobalt plate (tonne)	1,465	1,539	1,646	1,745
Plastic wood materials (tonne)	23,907	24,624	26,348	27,929

Source: Company data, Gao Hua Securities Research

### Valuation and DCF and SOTP as a cross-check

We derive our target price based on 2020E P/E and discount it back. We apply a 2020E P/E of 26X, derived from the average long-term P/E multiple for global leading battery material companies, including Asahi Kasei, Toray, UBE, and Nichia, etc. We apply a WACC of 7.66% by assuming a 30% long-term debt ratio. This gives a 12-month target price of Rmb6.90, implying 40.4X/30.8X 2017E/18E P/E. We cross-check our valuation with DCF, which generates a value of Rmb6.62, implying 5% upside. We believe the potential return growth has been mostly priced in, so we initiate with a Neutral rating.

### Exhibit 23: Cross-check with DCF valuation on GEM

#### DCF cross-check

GEM China (002340.SZ)																	
(Rmb mn)																	
	2010	2011	2012	2013	2014	2015	2016E	2017E	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E	Terminal Year
Revenue	570	919	1,418	3,486	3,909	5,117	6,929	8,971	10,697	12,450	14,118	15,585	16,433	17,384	18,269	18,978	
Year-over-year % change		61.2%	54.4%	145.8%	12.1%	30.9%	35.4%	29.5%	19.2%	16.4%	13.4%	10.4%	5.4%	5.8%	5.1%	3.9%	
EBITDA	145	225	299	528	646	775	911	1,309	1,586	1,887	2,162	2,409	2,548	2,702	2,836	2,935	
Year-over-year % change		54.7%	33.0%	76.6%	22.5%	20.0%	17.6%	43.7%	21.2%	19.0%	14.8%	11.5%	5.8%	6.1%	5.0%	3.5%	
Margin	25.5%	24.5%	21.1%	15.1%	16.3%	15.1%	13.1%	14.6%	14.8%	15.2%	15.3%	15.5%	15.5%	15.5%	15.5%	15.5%	
less (-) Capital Expenditures	(579)	(995)	(859)	(950)	(1,654)	(1,499)	(1,200)	(800)	(800)	(840)	(882)	(926)	(972)	(1,021)	(1,072)	(1,126)	
less (-) Taxes	(11)	(13)	(16)	(13)	(28)	(30)	(46)	(82)	(105)	(132)	(155)	(175)	(180)	(187)	(191)	(189)	
Free cash flow (FCF)	(445)	(783)	(576)	(436)	(1,037)	(754)	(335)	427	681	915	1,125	1,309	1,395	1,494	1,574	1,620	
Year-over-year % change		75.8%	-26.5%	-24.4%	138.0%	-27.3%	-55.6%	-227.5%	59.5%	n.m.	22.9%	16.3%	6.6%	7.1%	5.3%	3.0%	
Share count	121	290	580	753	924	1,455	2,911	2,911	2,911	2,911	2,911	2,911	2,911	2,911	2,911	2,911	
Year-over-year % change		138.9%	100.0%	30.0%	22.6%	57.5%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Discount period (years)									-	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00
Discount factor									1.00	0.93	0.86	0.80	0.74	0.69	0.64	0.60	0.55
PV of annual cash flows to equity									427	632	790	901	974	965	959	939	897
Terminal value																	35,792

VALUATION (Rmb mn)		SENSITIVITY ANALYSIS					
		WACC	Terminal Growth Rate				
			2.0%	2.5%	3.0%	3.5%	4.0%
Present value of cash flows (2017E-2025E)	7,485						
Present value of terminal value	19,828						
<b>Enterprise value</b>	<b>27,313</b>	5.8%	9.67	11.20	13.29	16.30	21.03
Less: 2017E net debt	8,032	6.3%	8.16	9.30	10.78	12.80	15.72
<b>Implied equity value</b>	<b>19,280</b>	6.8%	6.98	7.84	8.94	10.38	12.33
<b>Implied value per share (Rmb)</b>	<b>6.62</b>	7.7%	5.37	5.93	6.62	7.48	8.57
Current share price	6.33	2/7/2017	7.8%	5.22	5.76	6.42	7.24
% upside / downside	5%		8.3%	4.55	5.00	5.52	6.16
			8.8%	3.99	4.35	4.78	5.29
Implied P/E (X)							
2016E	69.8x						
2017E	38.8x						
2020E	19.5x						
Implied P/B (X)							
2016E	2.8x						
2017E	2.6x						
2020E	2.0x						
		<b>ASSUMPTIONS</b>		<b>WACC CALCULATION</b>			
		Cost of equity (COE)		9.3% Risk free rate (10yr Tre		3.3%	
		FCF perpetuity growth		3.0% Beta		1.0	
		Terminal multiple		21.4x Equity risk premium		6.0%	
		<b>Capital structure:</b>		<b>Cost of equity (CAPM)</b>		<b>9.27%</b>	
		% equity		70.0%		Tax rate	
		% debt		30.0%		<b>After tax cost of debt</b>	
						<b>3.9%</b>	
				<b>WACC</b>		<b>7.66%</b>	

Source: Company data, Gao Hua Securities Research

### Risks

**Upside: Higher demand for NCM/NCA cathode/precursors and cobalt price.** GEM recently entered into strategic cooperation with ECOPRO to jointly develop NCA cathodes in China, we believe this will enhance its product quality and technical know-how to meet growing demand of high-end ternary materials. Also, we believe the rising cobalt price will benefit leading cobalt refining companies like GEM due to the revaluation potential of its inventory and margin expansion.

**Downside: Tight working capital cycle and delay in subsidy payment on electronic waste recycling.** Although electronic waste and auto recycling offers a promising growth outlook, the business model still relies on government subsidies. As at December 2015, GEM had Rmb662 mn in outstanding receivables due from the government's subsidy program, representing 12.9% of its 2015 total revenue. Since the total processing volume will continue to rise, we believe the government (Ministry of Finance) needs to enlarge the total subsidy funding size to support the recycling industry growth.

Note: Prices in this report are as of the Feb. 7, 2017 market close unless indicated otherwise.

## Appendix: Glossary of terms

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**Cathode:** The electrode that receives electrons through the discharge process, the negative side. Cathode's material and chemical composition is used to describe the type of battery.

**Anode:** The electrode that releases electrons on discharge, the positive side.

**Separator:** Battery separators create a barrier between the positive (anode) and negative (cathode) electrodes to prevent electrical short-circuits.

**Dry Separator:** Often used in large batteries with high safety standards, including most lithium iron phosphate batteries used in commercial electric vehicles such as buses.

**Wet Separator:** Slimmer than a dry separator and commonly used in high energy density batteries, including ternary batteries.

**Electrolyte:** A conductive medium that enables lithium ions to move from the anode to the cathode when the battery is discharging and back when it is charging.

**Ternary Battery:** A type of battery whose cathode is typically either Nickel Cobalt Manganese (NCM) or Nickel Cobalt Aluminum (NCA). It offers high specific energy.

**Nickel Cobalt Manganese (NCM):** A type of cathode material contains certain proportion of nickel, cobalt and manganese. Its formula is  $\text{LiNi}_x\text{Co}_y\text{Mn}_z\text{O}_2$ . Common combination of x, y, z are 1/1/1, 5/2/3, 6/2/2 and 8/1/1.

**Nickel Cobalt Aluminum (NCA):** A type of cathode material contains certain proportion of nickel, cobalt and aluminum. Its formula is  $\text{LiNi}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$ .

**Lithium Iron Phosphate (LFP):** A type of cathode material contains  $\text{LiFePO}_4$ . LFP is one of the safest li-ion battery cathodes, but with low specific energy.

**Lithium Cobalt Oxide (LCO):** A type of cathode material with chemistry formula of  $\text{LiCoO}_2$ . LCO has high specific energy and high cost due to high cobalt content.

**Graphene:** A single atomic layer of graphite arranged in a hexagonal lattice, and is the world's first 2D (single layer) material.

**Energy Density:** The amount of energy (Wh) that a battery can deliver per unit of volume, similar to specific energy.

**Electric Vehicle (EV):** An automobile that is powered by electric energy stored in rechargeable batteries. Lithium ion batteries are the mainstream power source for EVs.

**Plug-in Hybrid Electric Vehicle (PHEV):** A type of hybrid vehicle uses batteries that can be recharged by plugging it into an external source of electric power. Similar to HVs, PHVs have series and parallel drivetrains. A PHV's battery volume is larger compared to that of a HV, but smaller compared to that of an EV. Driving distance for PHVs depends on the battery size.

**kWh(Kilowatt-hour):** Unit measure of energy use or discharge over a specific period of time.

**kW (Kilowatt):** Unit measure of energy use or discharge at a moment of time.

**Pyrometallurgy:** A technical process for battery recycling through melting metals under high temperature.

**Hydrometallurgy:** A technical process for battery recycling by using solutions to extract metals in the battery.

*Gao Hua Securities acknowledges the role of Vincent Yang of Goldman Sachs in the preparation of this product.*

# 信息披露附录

## 申明

本人，何方，在此申明，本报告所表述的所有观点准确反映了本人对上述公司或其证券的个人看法。此外，本人薪金的任何部分不曾与，不与，也将不会与本报告中的具体推荐意见或观点直接或间接相关。

## 投资摘要

投资摘要部分通过将一只股票的主要指标与其行业和市场相比较来评价该股的投资环境。所描述的四个主要指标包括增长、回报、估值倍数和波动性。增长、回报和估值倍数都是运用数种方法综合计算而成，以确定该股在地区研究行业内所处的百分位排名。

每项指标的准确计算方式可能随着财务年度、行业和所属地区的不同而有所变化，但标准方法如下：

**增长**是下一年预测与当前年度预测的综合比较，如每股盈利、EBITDA 和收入等。**回报**是各项资本回报指标一年预测的加总，如 CROCI、平均运用资本回报率及净资产回报率。**估值倍数**根据一年预期估值比率综合计算，如市盈率、股息收益率、EV/FCF、EV/EBITDA、EV/DACF、市净率。**波动性**根据 12 个月的历史波动性计算并经股息调整。

## Quantum

Quantum 是提供具体财务报表数据历史、预测和比率的高盛专有数据库，它可以用于对单一公司的深入分析，或在不同行业和市场之间的公司之间进行比较。

## GS SUSTAIN

GS SUSTAIN 是侧重于长期做多建议的相对稳定的全球投资策略。GS SUSTAIN 关注名单涵盖了我们认为相对于全球同业具有持续竞争优势和出色的资本回报、因而有望在长期内表现出色的行业领军企业。我们对领军企业的筛选基于对以下三方面的量化分析：现金投资的现金回报、行业地位和管理水平（公司管理层对行业面临的环境、社会和企业治理方面管理的有效性）。

## 信息披露

### 相关的股票研究范围

何方：A 股燃气和太阳能、中国燃气和太阳能。

A 股燃气和太阳能：隆基股份、科陆电子、阳光电源、金风科技。

中国燃气和太阳能：当升科技、北京控股、阿特斯、沧州明珠、中国燃气、华润燃气、新天绿色能源、新奥能源、保利协鑫、格林美、晶科能源、昆仑能源、兴业太阳能、中石化冠德、天合化工、港华燃气、天合光能、金风科技 (H)、信义光能。

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没有对下述公司的具体信息披露：格林美 (Rmb6.31)

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**潜在回报**：代表当前股价与一定时间范围内预测目标价格之差。分析师被要求对研究范围内的所有股票给出目标价格。潜在回报、目标价格及相关时间范围在每份加入投资名单或重申维持在投资名单的研究报告中都有注明。

**研究行业及评级**：分析师给出下列评级中的其中一项代表其根据行业历史基本面及 / 或估值对研究对象的投资前景的看法。**具吸引力(A)**：未来 12 个月内投资前景优于研究范围的历史基本面及 / 或估值。**中性(N)**：未来 12 个月内投资前景相对研究范围的历史基本面及 / 或估值持平。**谨慎(C)**：未来 12 个月内投资前景劣于研究范围的历史基本面及 / 或估值。

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