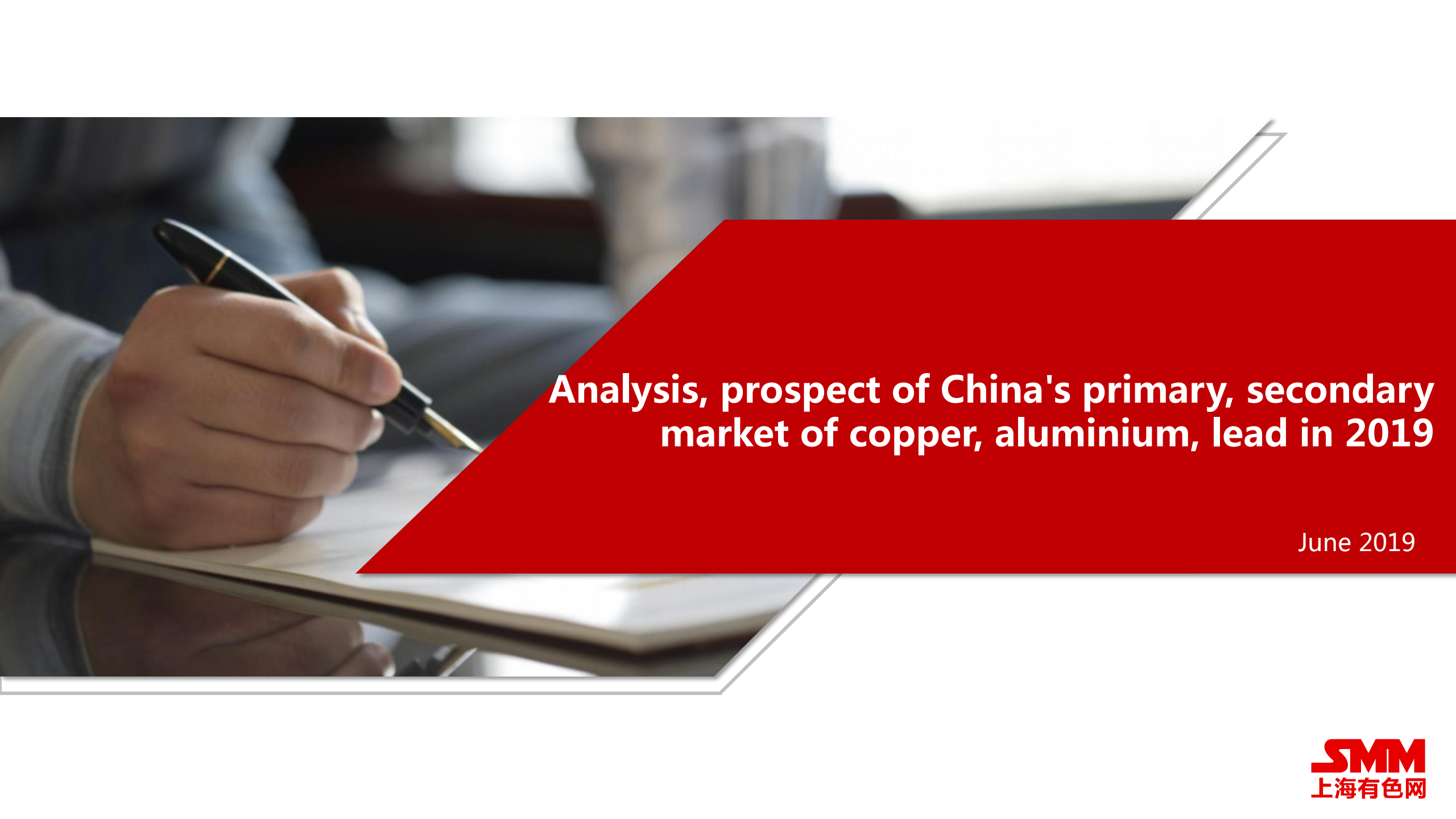
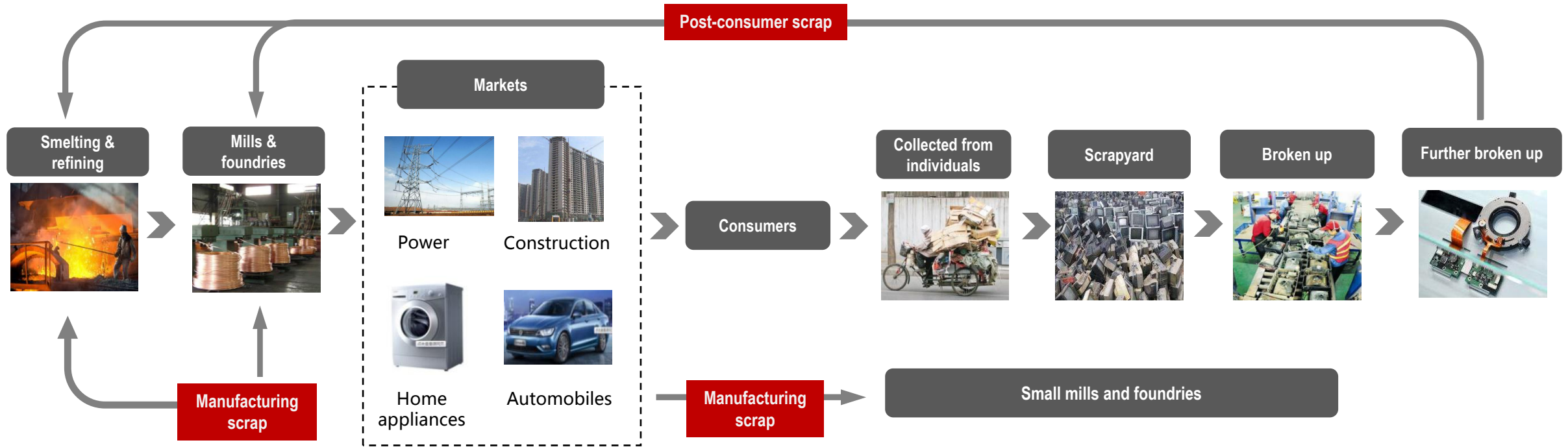




Analysis, prospect of China's primary, secondary market of copper, aluminium, lead in 2019

June 2019

What is copper scrap?

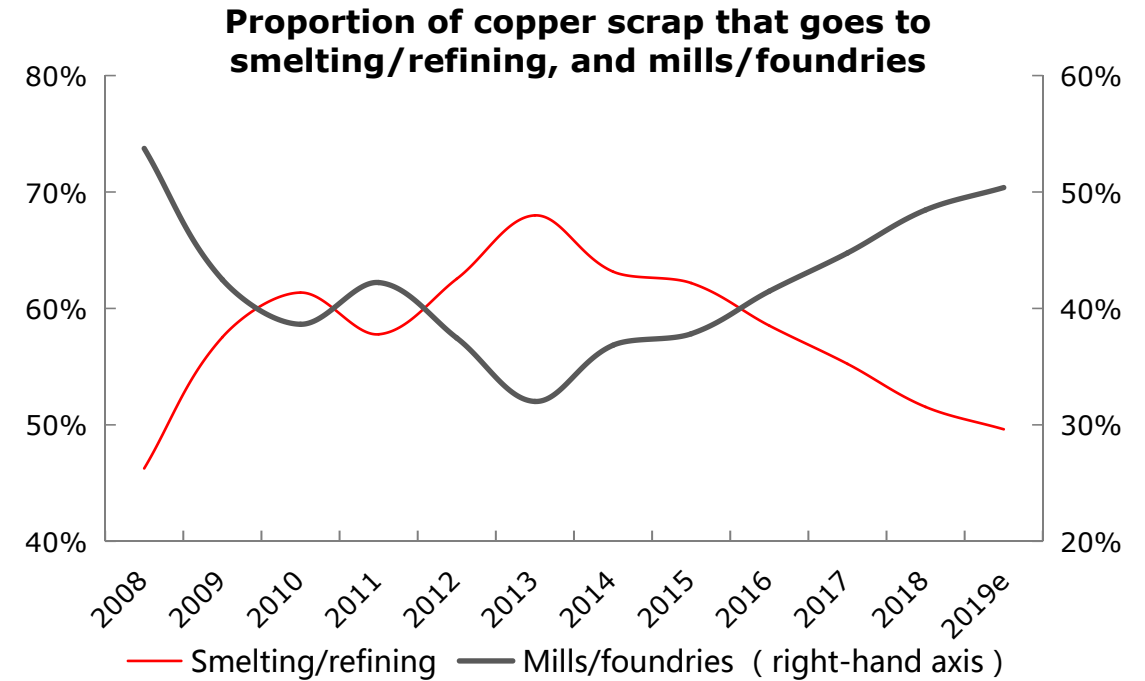


■ **Copper scrap in China comprises recyclable materials left over from manufacturing and consumption. About half is new manufacturing scrap, and the other is old post-consumer scrap.**

- **Old post-consumer copper scrap:** A type of copper waste produced by end-consumers. China now faces significant growth in scrap supply, as more copper products will be available for recovery once they reach their lifespan of 15 years.
- **New manufacturing copper scrap:** A type of copper waste from the manufacturing process, across smelting, refining, mills and foundries. This includes furnace slag, anode slime, off-cuts and defective products. Over 90% of manufacturing copper scrap returns into the usage cycle during smelting and refining and do not enter markets.
- SMM focuses on post-consumer copper scrap, as manufacturing scrap has little impact on the supply and demand for copper cathode.

Where does copper scrap go?

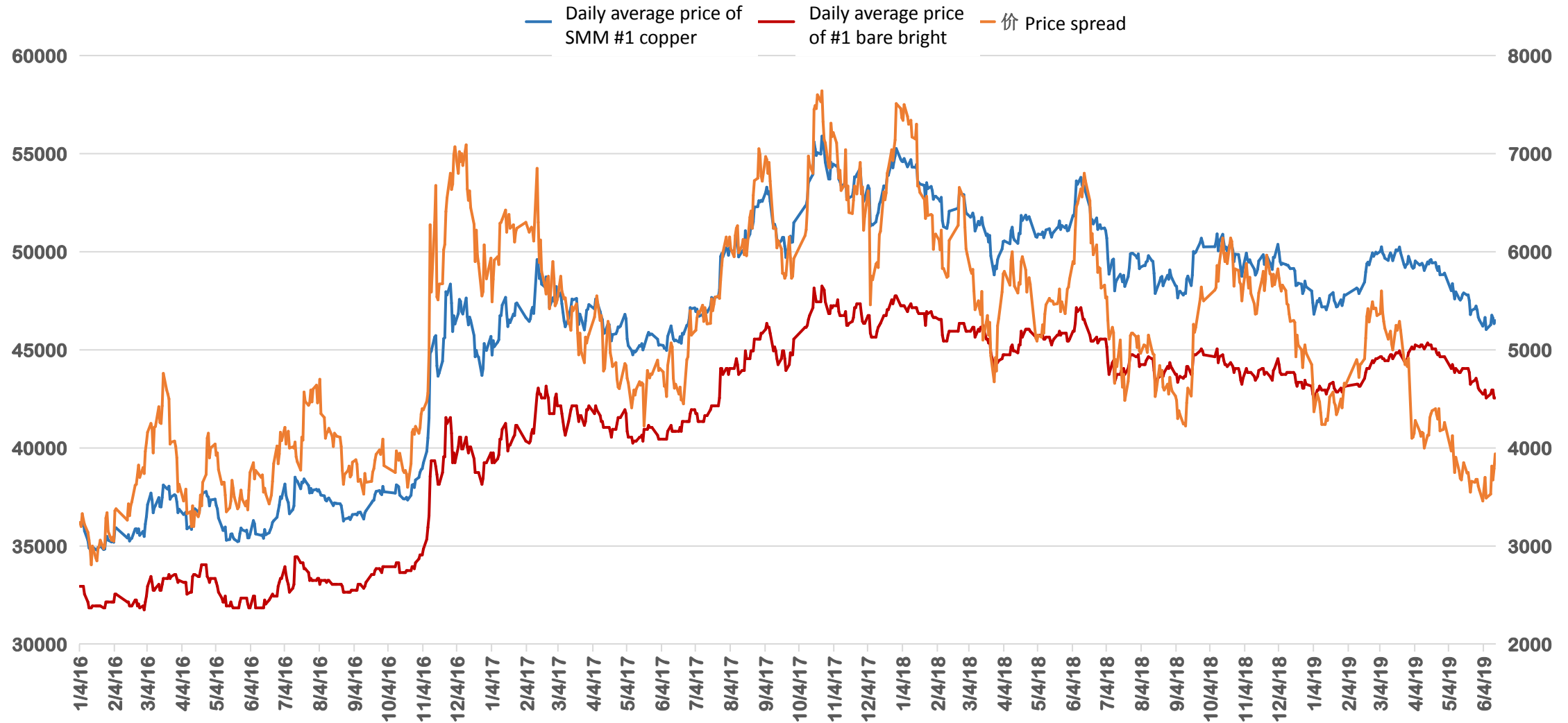
Where copper scrap goes			
	Smelting & refining	Mills & foundries	
		Copper rod	Brass bar
Type	1#copper scrap, 2#copper scrap, red copper scrap	Bare bright copper, granulated copper wire	Brass scrap
Source	Imports account for over 70%	Domestic materials account for over 95%	Imports account for over 60%
Grade	Cu>94%	Cu>98%	Cu 65%



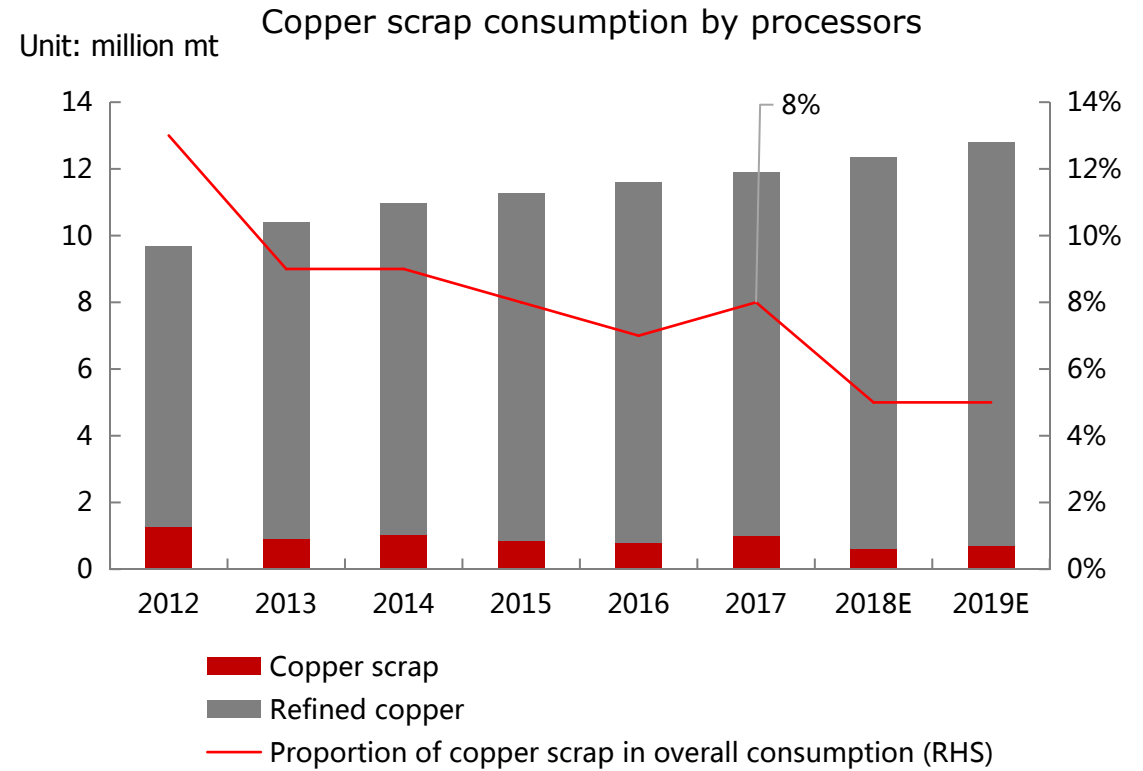
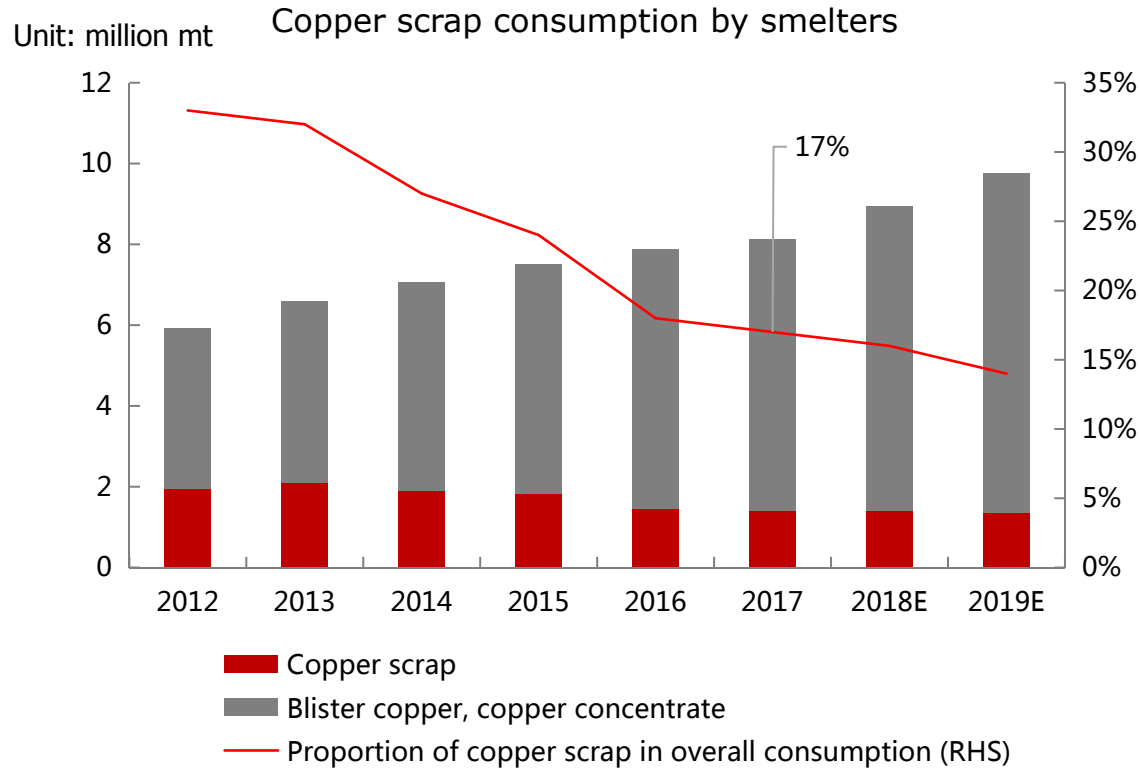
■ Copper scrap goes to the smelting and refining stages or mills and foundries.

- **Mills & foundries:** Some copper scrap can be re-melted by brass mills, wire rod producers and foundries. Wire rod producers rely on domestic bare bright copper, with an average copper content over 98%. Brass bar producers rely on brass scrap, with an average copper content of some 65%. Imports account for some 60%.
- **Smelting & refining:** Some copper scrap returns to the cycle at the smelting and refining stages and is produced into copper cathode. 1# copper scrap, 2# copper scrap account for the majority of such materials, with a copper content over 94%.
- Stricter environmental standards and control over scrap imports have reduced the proportion of copper scrap to smelting and refining, and grown the proportion of copper scrap to mills and foundries.

Price spread between refined, scrap copper narrows



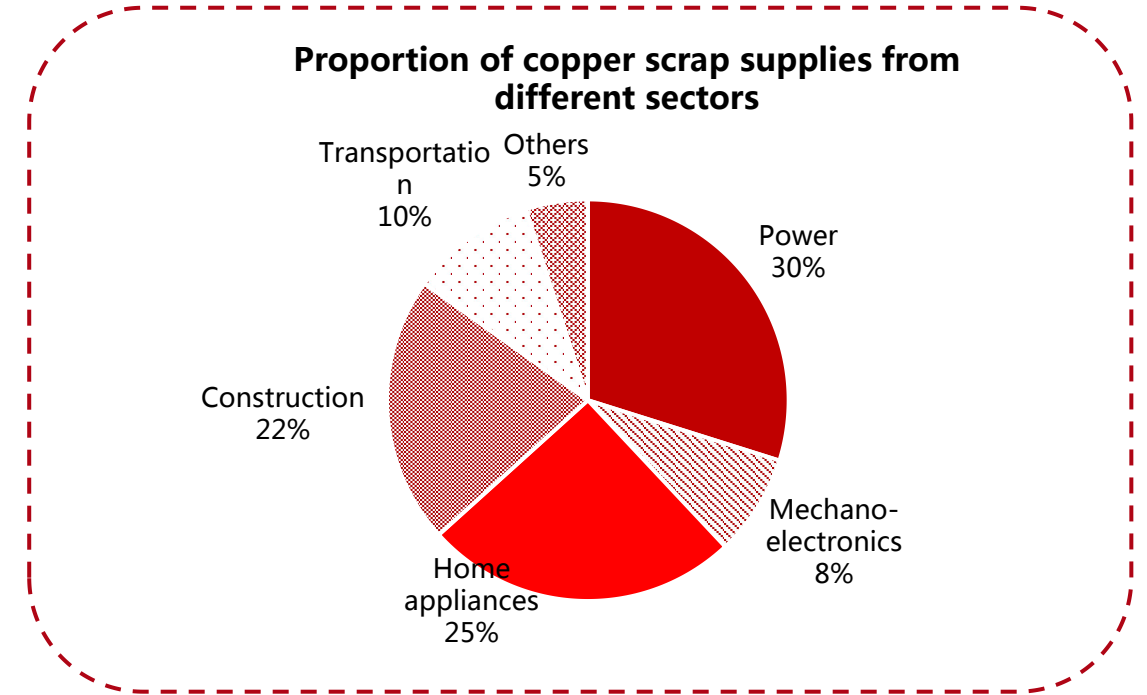
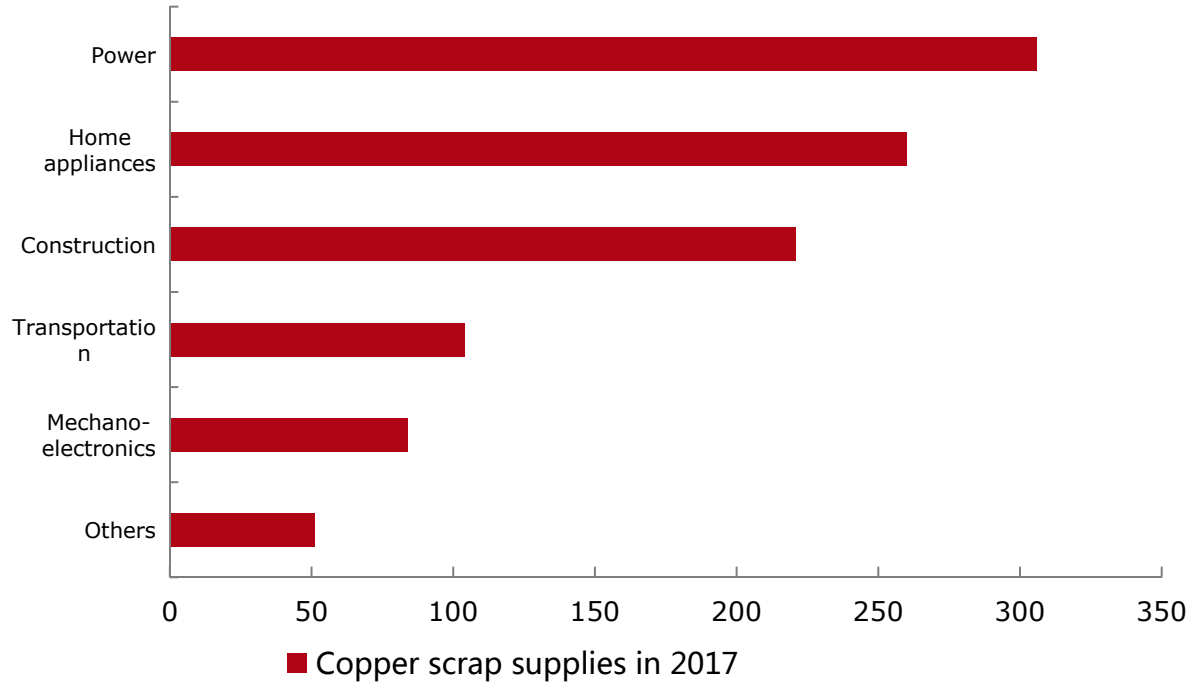
Trends in copper scrap consumption



■ Environmental factors, smaller price advantage lower copper scrap consumption

- Across smelting, some 17% of domestic copper cathode was produced from copper scrap. In processing, around 8-10% of the copper products used scrap as raw materials.
- In recent years, the proportion of scrap copper in overall consumption dropped significantly in smelting and processing. Stricter import policies and environmental curbs affected the consumption of copper scrap across smelters.
- The smaller price spread between refined and scrap copper, as well as the environmental impact, deterred processors from using copper scrap as raw materials.

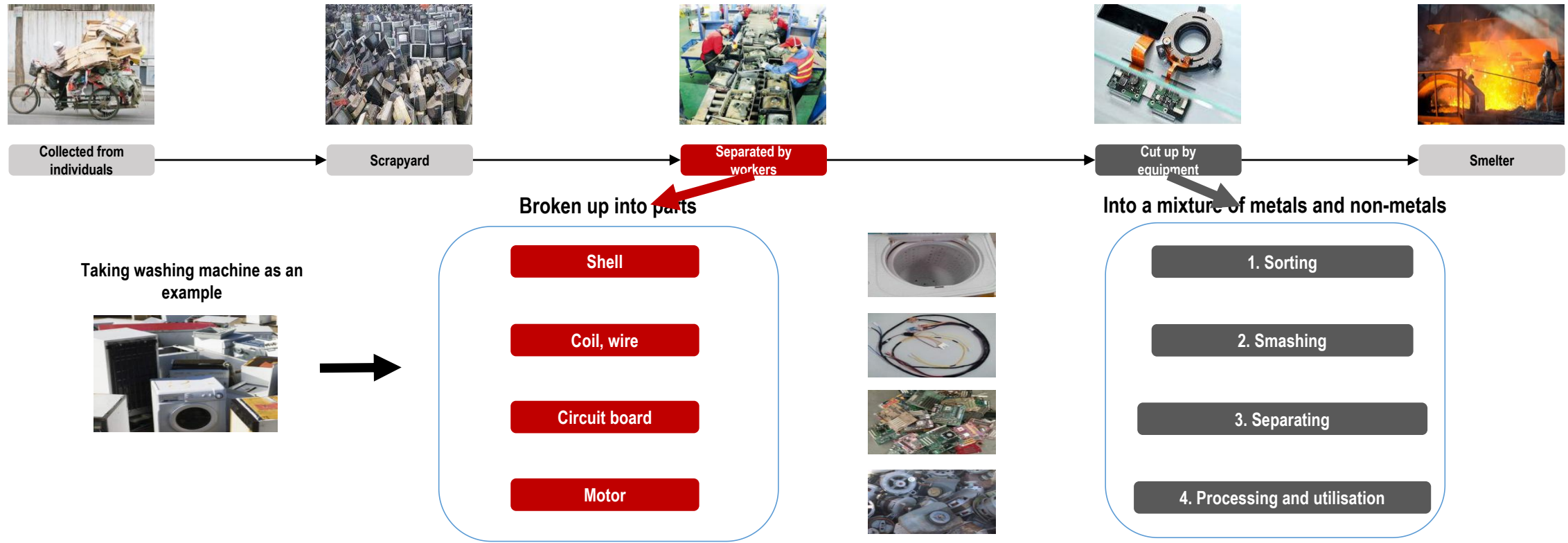
Where does post-consumer copper scrap come from?



■ Post-consumer copper scrap comes from the power, home appliances, construction, transportation and mechano-electronics sectors.

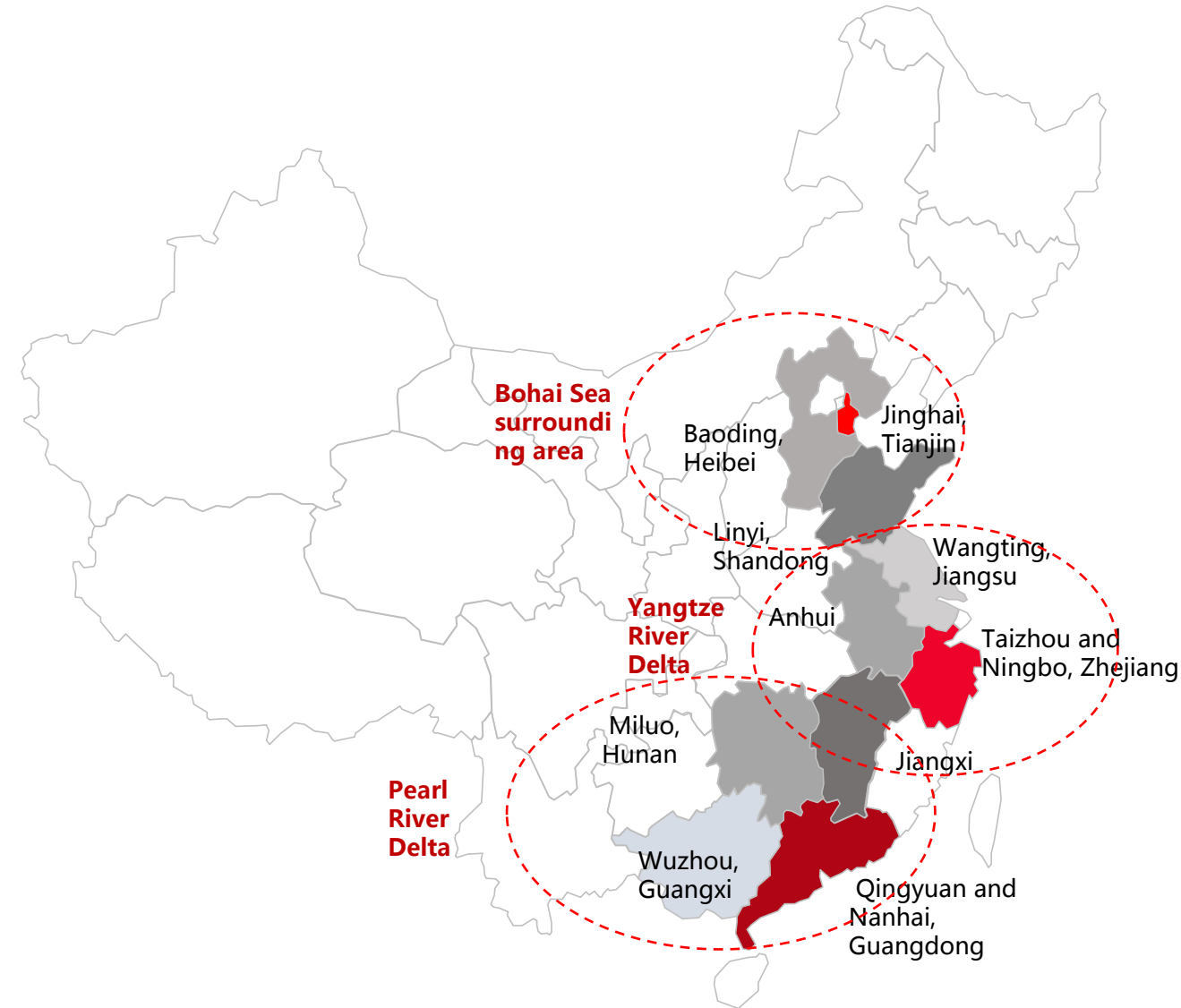
- Consumers of copper cathode are sources of copper scrap. The power sector, as the top consumer of copper cathode, is the biggest source of copper scrap. This is followed by home appliances and construction. The three top consumers account for some 80% of copper scrap.
- The recovery rate of copper recycling in China is relatively low at 60%. The recycling chain that starts from construction, auto, machinery or shipbreaking sectors is relatively simple, while waste home appliances and electronic products go through a more complicated recycling process.
- Supplies of copper scrap in China are expected to expand after 2019, as outdated copper products available for recovery will grow when they reach an average of 15 years of service.

Copper scrap breaking industry in China



- **A lack of regulation accounts for the low recovery rate of copper scrap**
- Scrap is usually broken up in two stages. Scrap is separated into parts before parts such as motors and circuit boards are smashed into a mixture of metals and non-metals.
- Most large scrapyards only take the first step, while small components that are difficult for workers to dismantle will be sent to small dismantling plants.
- The *Regulations for the Administration of the Recovery and Treatment of Waste Electric and Electronic Products* took effect in 2011. Under this, scrap firms that dismantle electronics have to obtain operation permits and receive subsidies from government funds. This policy significantly promoted the development of the scrap breaking industry in China.
- A financing gap, however, deterred scrap breaking firms from receiving subsidies, and prompted them to cut waste procurement. Scrap collectors had to dismantle home appliances on their own, resulting in pollution and the rise of small, illegal dismantling plants.

Major copper scrap markets in China

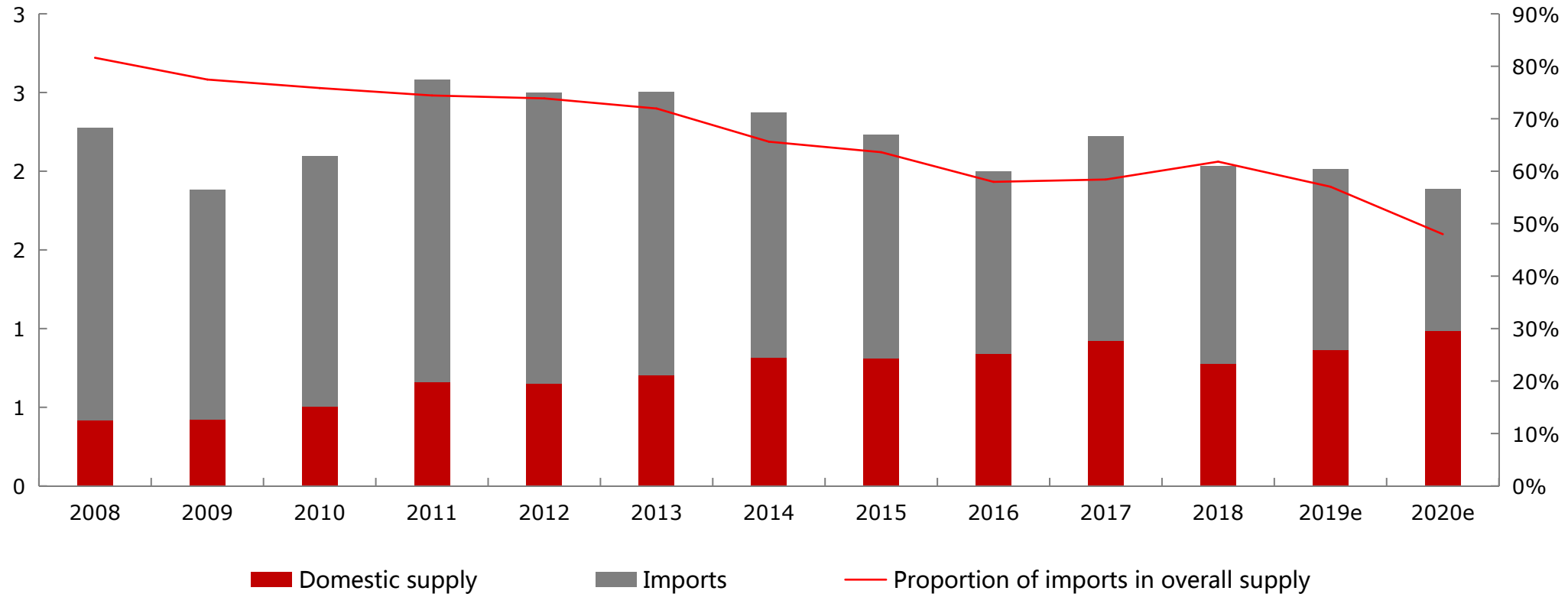


■ China's copper scrap markets are located in the Yangtze River Delta, Pearl River Delta and Bohai Sea area.

- Copper scrap is dismantled, processed and then consumed, in these three regions. Copper scrap recycled across the three regions accounts for 80% of the total in China.
- Zhejiang's Taizhou and Ningbo in the Yangtze River Delta, Guangdong in the Pearl River Delta and Tianjin, Hebei and Shandong in Bohai Sea surrounding area are the top hubs. Taizhou's Luqiao, Hebei's Anxin, Guangdong's Qingyuan, Jiangsu's Yixing and Suzhou are major copper scrap markets, with large trading and dismantling volumes.
- The copper scrap markets in Guangdong, Zhejiang and Tianjin rely on imported copper scrap, while those in Shandong's Linyi, Hebei's Baoding and Hunan's Miluo depend on domestic materials.
- China's copper scrap industry is often concentrated in an industrial park, governed by the local government. Examples include the Tianjin Ziya Circular Economy Area, Guangdong Qingyuan Huaqing Circular Economy Park and Hunan Miluo Tongli Circular Economy Industrial Park.

China's copper scrap supply

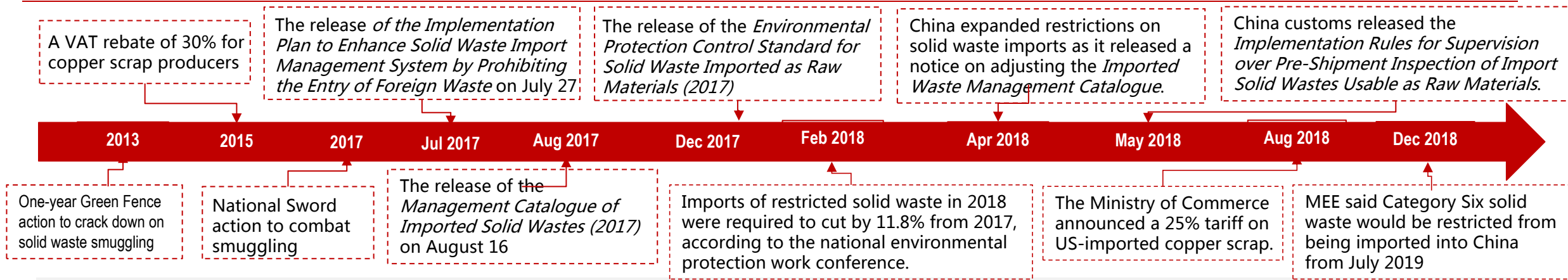
Unit: million mt



■ Growth in domestic supplies at lows, imports trend downwards

- Imports of copper scrap declined yearly after China Customs launched the Green Fence crackdown in 2013. A surge in copper prices at the end of 2016 drove downstream demand to cheap copper scrap, and bolstered copper scrap supply in 2017.
- Domestic supplies of copper scrap grew at limited rates in recent years, lowered by fewer waste disposal projects from the State Grid, limited dismantling of mechanical and electrical products, and lower-than-expected dismantling of automobiles.
- While China depended on seaborne copper scrap to meet domestic demand, stricter restrictions on waste imports and an improving domestic copper scrap market are expected to lower the proportion of imported copper scrap in overall supplies to 50% by 2020, from around 80% in 2008.

Development of copper scrap import policies in China



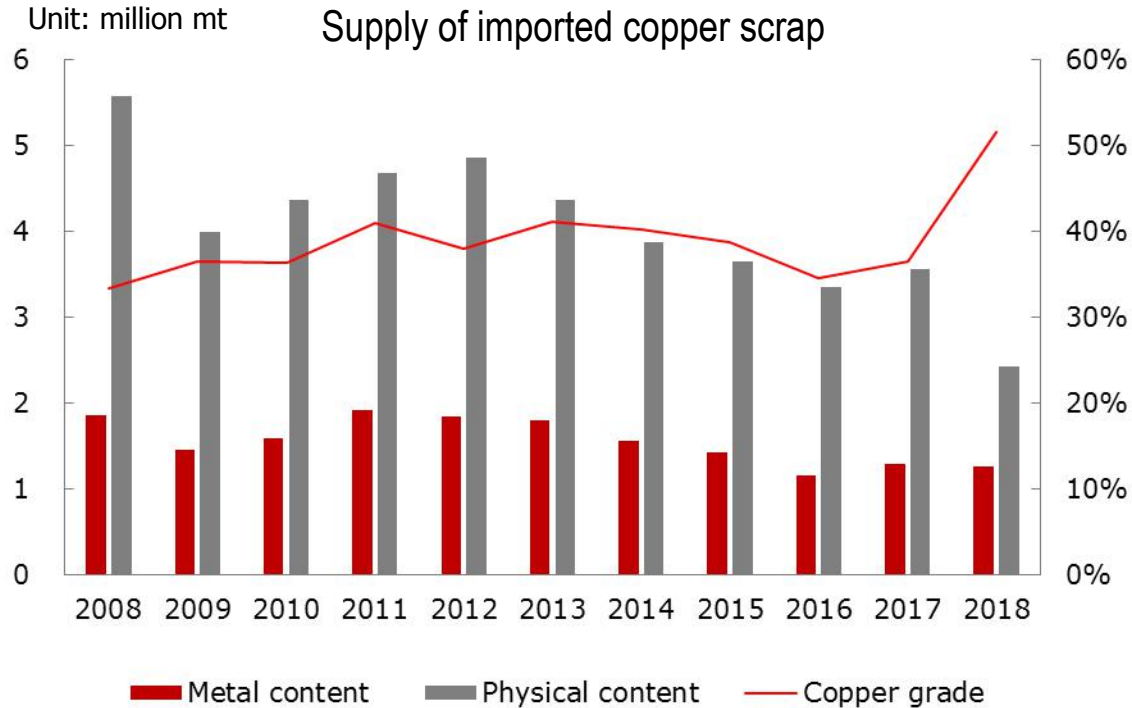
■ Policies on copper scrap imports in 2017-2019

- China aimed to stop importing solid waste by the end of 2019, according to the *Implementation Plan to Enhance Solid Waste Import Management System by Prohibiting the Entry of Foreign Waste* released in July 2017.
- China banned imports of Category Seven copper scrap from December 31, 2018, according to a notice in April 2018 in the *Imported Waste Management Catalogue*.
- In August 2018, the Ministry of Commerce announced a 25% tariff on US-imported copper scrap, in a trade war with the US.
- China recategorised Category Six copper scrap from a non-limited import category into restricted imports that can be used as raw materials, effective from July 2019, said the Ministry of Ecology and Environment (MEE) in December 2018.

■ SMM's analysis of future policies

- Imports of solid waste, including Category Six copper scrap, will be cut to zero by 2020, after China stops importing solid waste that can be replaced by domestic resources by the end of 2019.
- Environmental authorities are likely to recategorise some Category Six materials as renewable resources to allow those imports amid the ban on solid waste imports. The key question is at what grade level that recategorisation will happen.
- China will strengthen supervision on the copper scrap industrial chain, and improve the recycling system for domestic scrap.

Will China see short supplies of imported copper scrap?



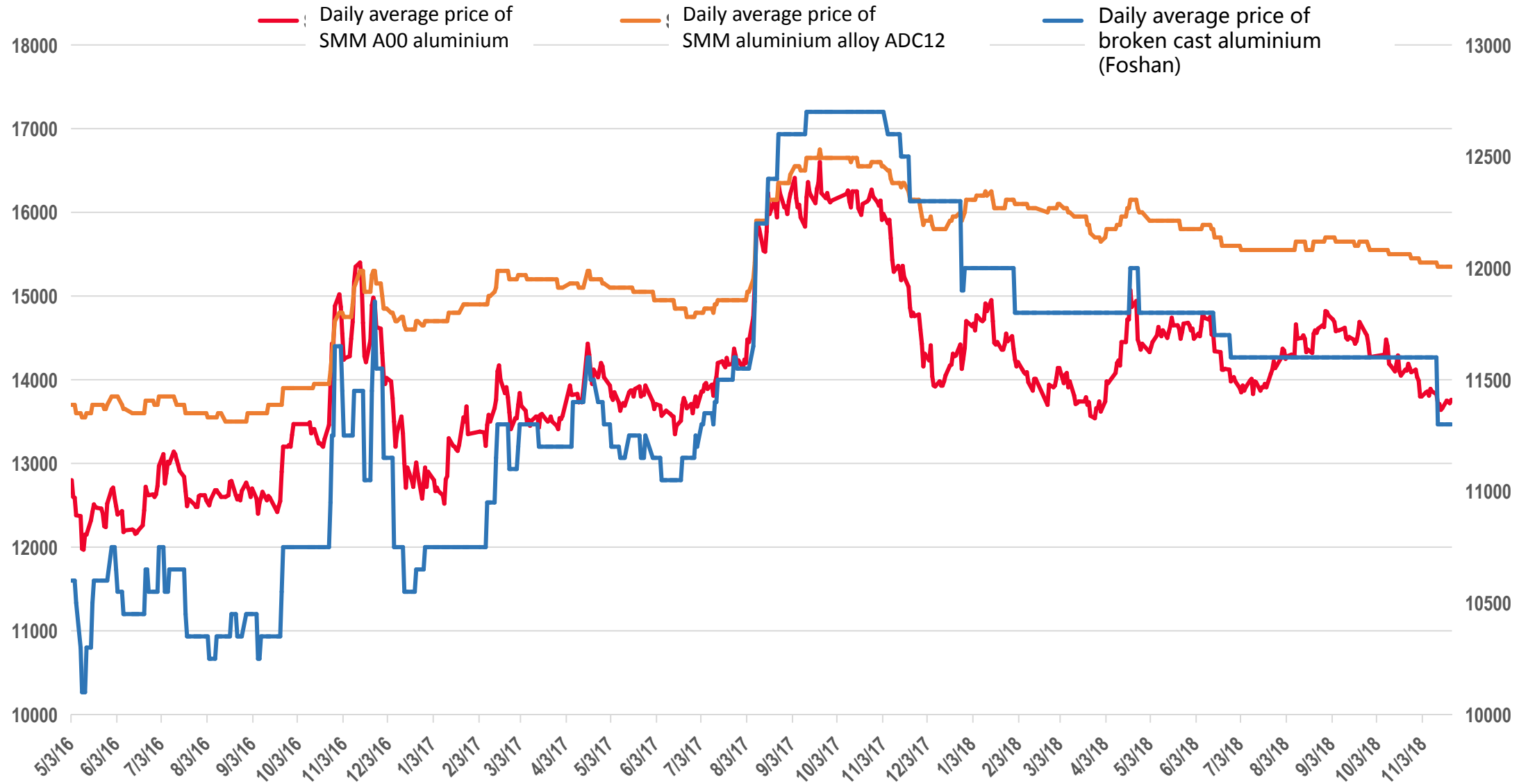
Category of copper scrap imports		
Difference	Category Six	Category Seven
HS code	7404000090	7404000010
Average Cu content	76%	24%
Product name	Other copper waste and scrap	Waste wire, cable, motor, hardware
Major type	Copper cable scrap, #1 copper scrap, 2# copper scrap, brass scrap, PCB board	Scrap water tank, waste motor, scrap copper cable
Whether need to be dismantled	No, it can be fed into furnaces directly	Yes
Consumer	Smelters, processing plants	Dismantling plants
Policy	Recategorised from non-restricted imports into restricted imports on July 1, 2019.	Recategorised from restricted imports into banned imports on January 1, 2019.

■ Higher grade of imports prevent shortage of seaborne supply in Cu content

- While China's imports of copper scrap in 2018 stood 36.7% lower than 2017 in physical content, the average Cu content of copper scrap imports climbed to some 56% from 37% in 2017, as restrictions on imports of Category Seven copper scrap bolstered imports of Category Six copper scrap. This resulted in a dip of 30,000 mt, in metal content, in 2018's copper scrap imports.
- In January-February 2019, the physical content of China's copper scrap imports declined 27% on the year, but copper content of the imports increased 11% from the same period in 2018.
- In the short term, SMM believes that domestic companies can establish dismantling plants in South-east Asia and import Category Six copper scrap, after dismantling Category Seven copper in scrap materials.
- From 2020, the key will be determining what scrap grade is reclassified as a resource and still allowed to be imported. Once this policy is clearer in the middle of this year, Chinese investors will start to look at establishing facilities overseas to upgrade to the required grade or blister. While these investments take place, it is likely that there will be some tightness from a lack of scrap imports in 2020.

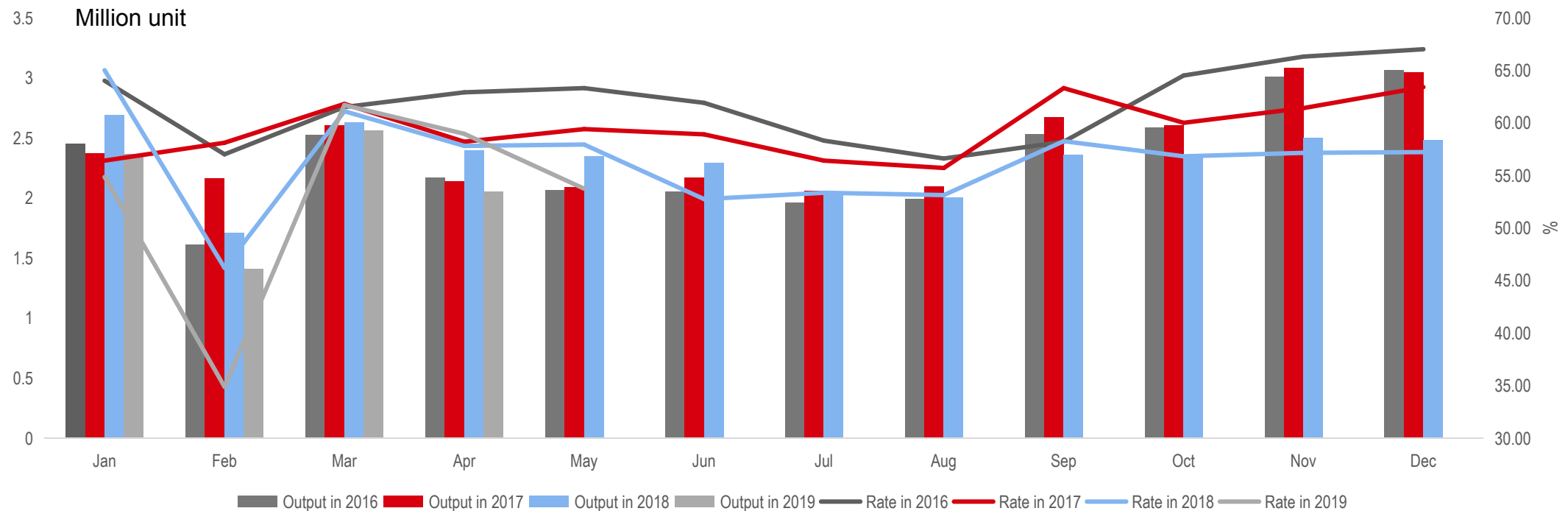
Prices of SMM A00 aluminium, aluminium scrap, and alloy

– scrap prices slow to respond



In 2016-2019, growth in China' car production falls, operating rates in secondary aluminium industry dip more significantly

Auto production, operating rates in secondary aluminium industry in 2016-2019

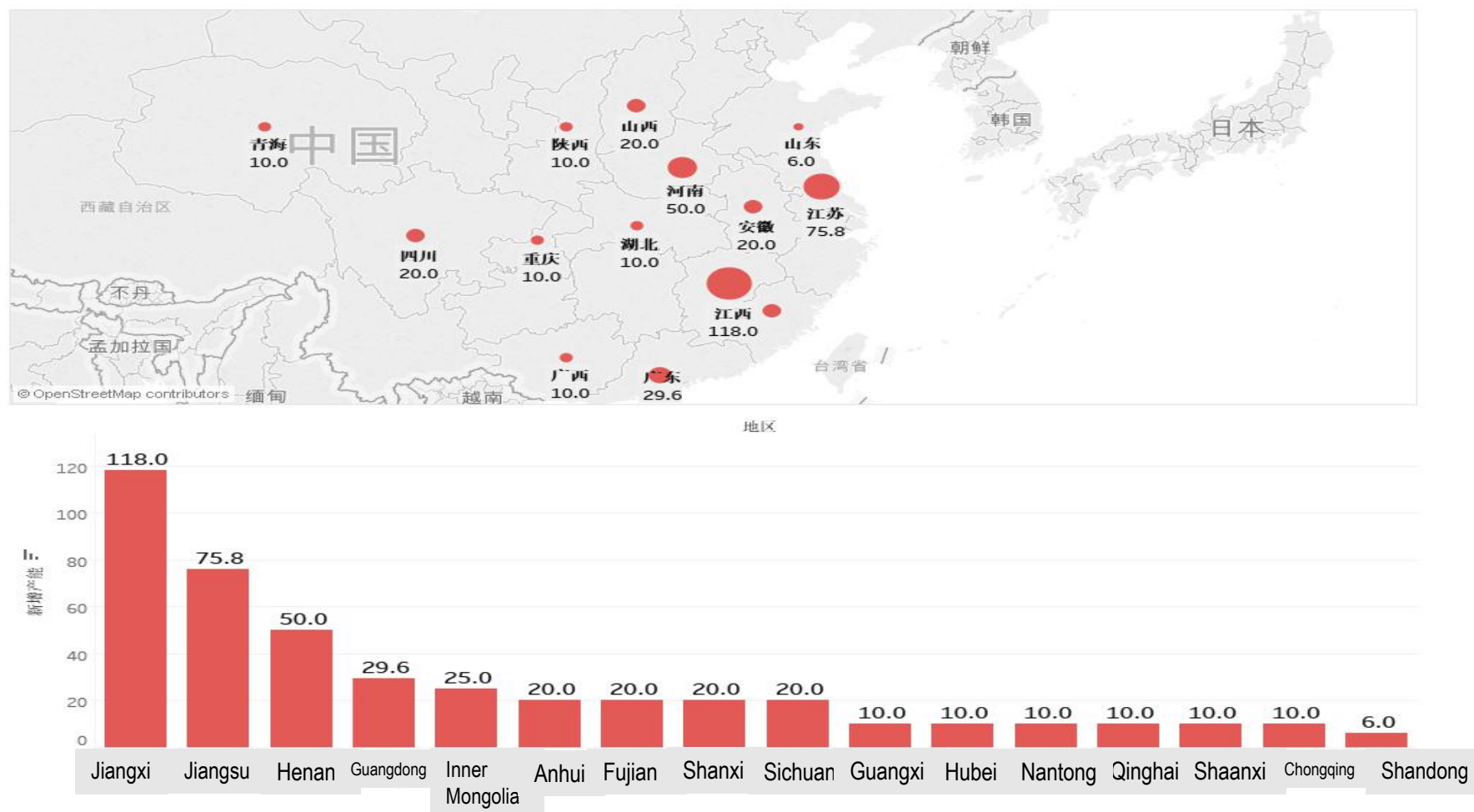


■ China's production of automobiles stood at 28 million units in 2016, at 29.07 million units in 2017, and **27.76 million units in 2018**.

■ Operating rates across China's secondary aluminium industry came in at 62.48% in 2016, at 60.54% in 2017, and **56.56% in 2018**.

Planned new capacity of secondary aluminium at 4.32 million mt for 2018 and later. Jiangxi, with preferential tax policies, outdoes major consumption areas (Jiangsu, Zhejiang, Shanghai, and Guangdong) in attracting new capacity

Scheduled new capacity of secondary aluminium in 2018 and after



China's policies on aluminium scrap imports in 2014-2018

Dec 30, 2014

Joint Announcement (No. 80 of 2014) by Ministry of Environmental Protection Ministry of Commerce National Development and Reform Commission General Administration of Customs General Administration of Quality Supervision

1. The announcement came into effect on January 1, 2015.
2. Compressed auto body (HS Code. 7204490010) and waste electric machines mainly for recycling aluminium, including waste wires, cables, hardware and electric appliance (HS Code. 7602000010) were listed as restricted imports.
3. Other aluminium wastes and scraps (HS Code. 7602000090) were listed as automatic-licensing imports that can be used as raw materials.

Dec 29, 2017

GB 16487.7—2017 Environmental Protection Control Standard for Imported Solid Wastes as Raw Materials, replacing GB 16487.7—2005.

For the imports of other aluminium wastes and scraps (HS Code. 7602000090):

1. The total weight of wastes listed in the *National Catalogue of Hazardous Wastes* shall be strictly restricted to a level not greater than 0.01% of the weight of the imported non-ferrous metal scraps
2. Mixing of non-ferrous metals with other inclusions, with a particle size of not more than 2 mm, **should not exceed 1% of the total weight of the imported waste non-ferrous metals**. Of which the total amount of powder, with a particle size of not more than 2 mm, **should not exceed 0.1% of the total weight of imported non-ferrous metals**.
3. Mixing of ferrous metals with other inclusions shall not exceed 0.5% of the total weight of the imported waste and scrap of iron and steel.

Mar 23-Apr 2, 2018

China responded to US' tariffs on Chinese steel and aluminium products

1. On March 23, China proposed to impose additional tariffs on 7 categories and 128 items of US goods. **This included aluminium scrap, which shall subject to 25% more tariffs.**
2. **The new tariffs took effect on April 2.**

May 4, 2018

The General Administration of Customs (GAC) issued the Notice of the General Administration of Customs on Implementing Early Risk Warning and Supervision Measures regarding US Wastes as Raw Materials Imports on May 3, 2018.

1. From the date of May 4, 2018, all of the boxes of imported wastes as raw materials from the United States will be required to be 100% opened for inspections.
2. From May 4, 2018, **China Certification & Inspection Group (CCIC)'s Northern America Limited Company will be imposed on an A category risk early warning measure, and the time period is one month (from May 4, to June 4, 2018)**. During this period of time, this Company will not conduct pre-shipment inspections on importation of wastes as raw materials. The information management system for pre-shipment inspections on importation of wastes as raw materials (PSI) will be temporarily shut down.

Apr 18, 2017

The Implementation Plan to Enhance Solid Waste Import Management System by Prohibiting the Entry of Foreign Waste was approved in 34th meeting of the Central Leading Group for Comprehensively Deepening Reforms.

1. It was completely forbidden to import solid wastes with major environmental hazards and intense public reaction before 2018.
2. **Imports of solid waste that can be replaced with domestic resources shall be gradually halted by the end of 2019.**

Jul 20, 2017

No. 70 [2017] issued by the General Office of the State Council
The document provided core concept for the follow-up policies on aluminium scrap imports, except for policies regarding additional tariffs between China and the US. The core concept that has been carried out includes:

1. In (5) of II, **reduce the types and quantities of solid waste imports gradually and in an orderly fashion**. Adjust the Catalogue for Administration of Solid Waste Imports in batches and by type, and greatly reduce the types and quantities of solid waste imported, with completion before the end of 2019.
2. In (6) of II, revise *Environmental Protection Control Standards for Import of Solid Waste Used as Raw Materials*, with completion before the end of 2017, and **tighten indicators for entrainment control**.
3. In (7) of II, refine the solid waste import licensing system, and **abolish importation through the agency of trading units**, with completion before the end of 2017.

Oct 1, 2017

No. 1606 [2017] issued by the Office of the Ministry of Environmental Protection
Amendments to the *Environmental Protection Regulations for Imported Solid Wastes as Raw Materials* (No. 70 of the Ministry of Environmental Protection, 2015):

1. **Push forward the abolishment of importation through the agency of trading units.**
2. **Remove the item that allowed solid waste import license to be extended.**

Feb 2, 2018

National environmental protection work conference for 2018 was held.
It was emphasized that the annual imports of restricted solid waste shall be lowered by 11.8% year on year.

Apr 19, 2018

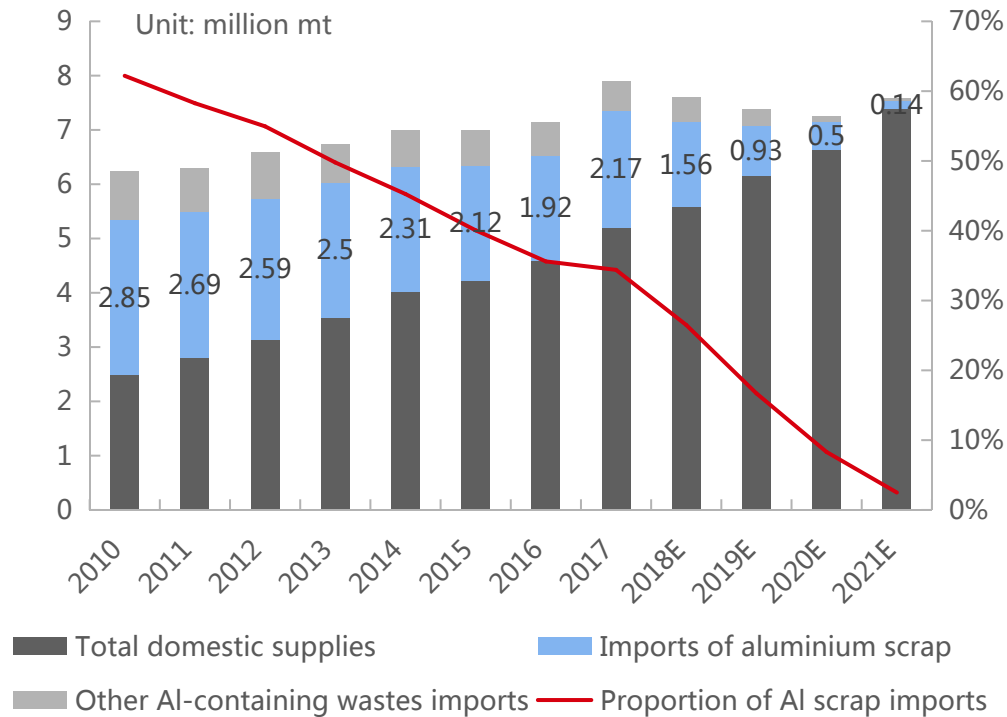
Announcement on Amending Catalogue of Imported Waste Aluminium Management:
A total of 16 types of solid wastes, including **scrap hardware**, waste ship, smelting slag, and industrial waste plastics were moved to *Catalogue of Solid Wastes Forbidden to Import*, from *Catalogue of Restricted Import Solid Wastes that Can Be Used as Raw Materials*. The amended document will take into force from December 31, 2018.

May 28, 2018

The GAC formulated and issued the **Implementing Rules for the Supervision and Administration of Pre-shipment Inspections of Imported Solid Waste Usable as Raw Materials** on May 28, 2018. Effective from June 1, 2018, the Rules provide that the **GAC will not designate specific agencies to carry out pre-shipment inspections of waste usable as raw materials**. The GAC will subject agencies, which engage in pre-shipment inspections of imported waste useable as raw materials, to the administration by record-filing. Third-party inspection agencies shall apply for filing a record with the GAC, before starting the business to carry out pre-shipment inspections of waste usable as raw materials.

While demand for some 300,000 mt supplied aluminium scrap to be further processed in China cannot be met by domestic scrap in 2019, some 475,000 mt aluminium scrap imports under general trade will face restrictions. The curbs are set to intensify tightness of domestic aluminium scrap.

Source of aluminium scrap in China 2010-2021



Import of Category Six aluminium scrap to be restricted on July 1

Unit: 1,000 mt	General trade	Supplied materials for further processing	Unwrought aluminium alloy export	Aluminium scrap needed for the export
2018	950	610	450	602
Half a year	475	305	225	301
	Recycled materials	New scrap from manufacturing	Other Al-containing solid waste imports	Total
2018	3,090	2,280	450	5,820
2019E	3,590	2,390	300	6,280
Addition	500	110	-150	460

- While demand for some 300,000 mt supplied aluminium scrap to be further processed in China cannot be met by domestic scrap in 2019, some 475,000 mt aluminium scrap imports under general trade will face restrictions. The curbs are set to intensify tightness of domestic aluminium scrap.
- Growth in aluminium scrap supply in China will be driven by imported recycled materials. SMM expects China to see an addition of about 500,000 mt of recycled aluminium materials in 2019. Uncertainties around aluminium scrap invoices will affect the actual supplies.

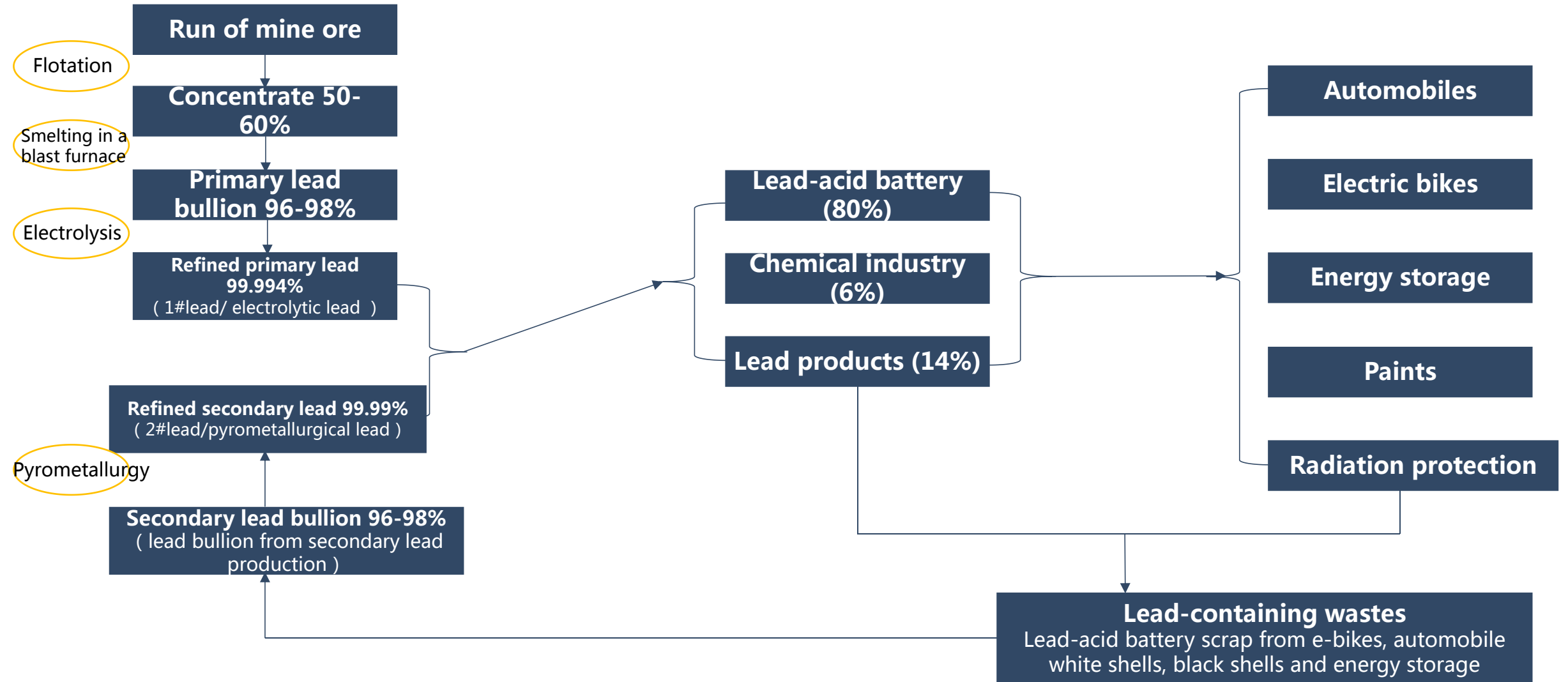
VAT cuts in manufacturing grow expectations of consumption recovery in H2

Impact of lower VATs on secondary aluminium industry



- **Raw materials: Lower VATs reduced the tax burden in the secondary aluminium industry.** Based on a refund of 30%, the actual VAT for per 100 yuan profit stood at 9.1 yuan ($13 - 13 \times 30\%$), after the VAT cuts by 3 percentage points to 13%. This stood 2.1 yuan lower than that before the cuts, which was 11.2 yuan ($16 - 16 \times 30\%$).
- **Processing: Lower VATs had little impact on the processing end as the taxable portion is relatively small.** For example, net profit margins of ADC12 aluminium alloy ingot do not exceed 5% of its selling prices. Based on a processing charge of 500 yuan/mt for ADC12 aluminium alloy ingot, the lower VATs caused a price cut of 15 yuan/mt ($500 \times 3\%$).
- **Downstream: VAT cuts spurred consumption across downstream sectors and overseas markets.** Consumers withheld from purchasing ahead of the lower VATs, as evidenced by expanded year-over-year declines in sales. For a 200,000-yuan car, a VAT cut of 3% led to a price cut of 6,000 yuan.

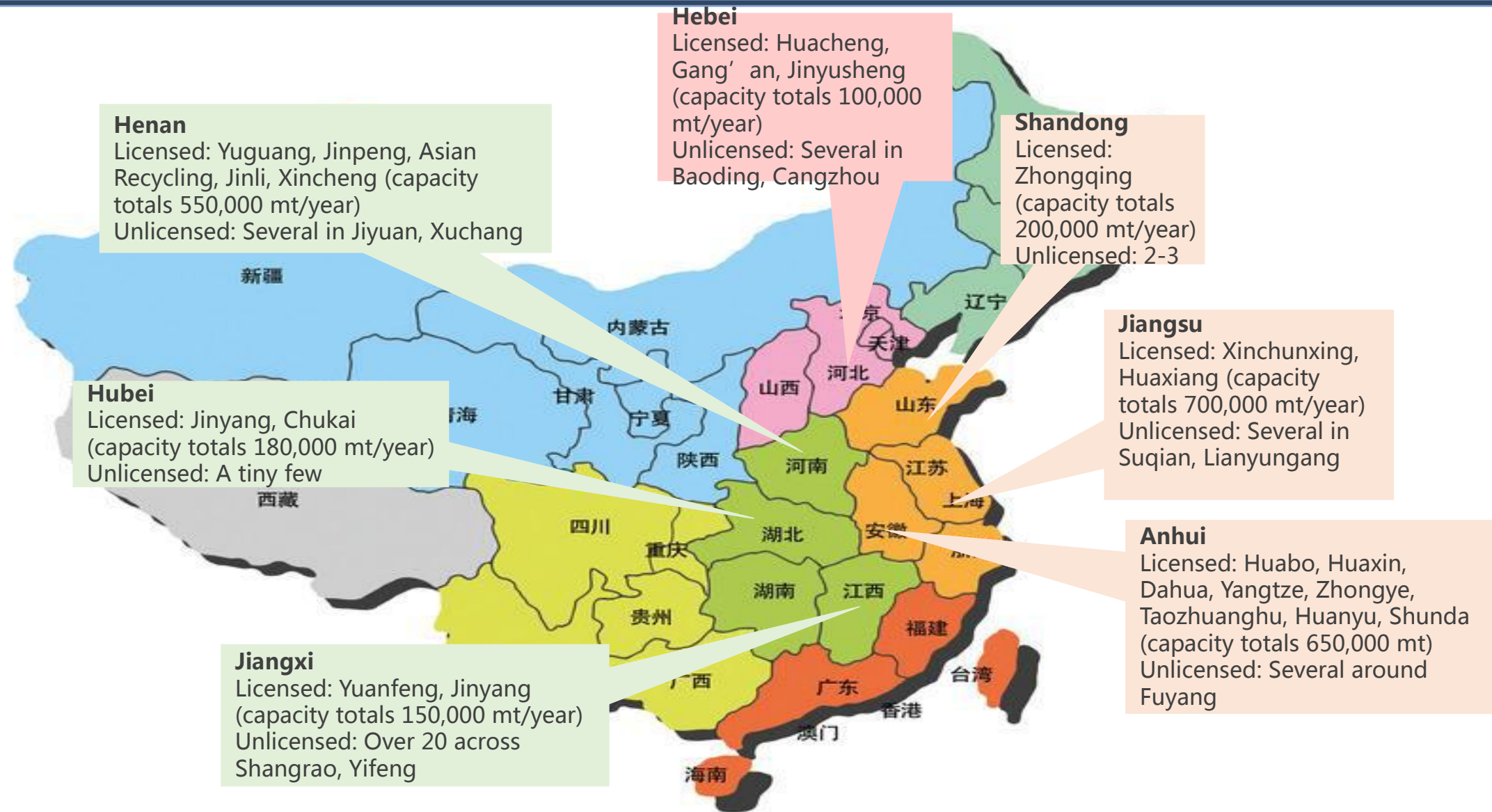
Lead industry chain



Lead-containing waste– lead-acid battery scrap

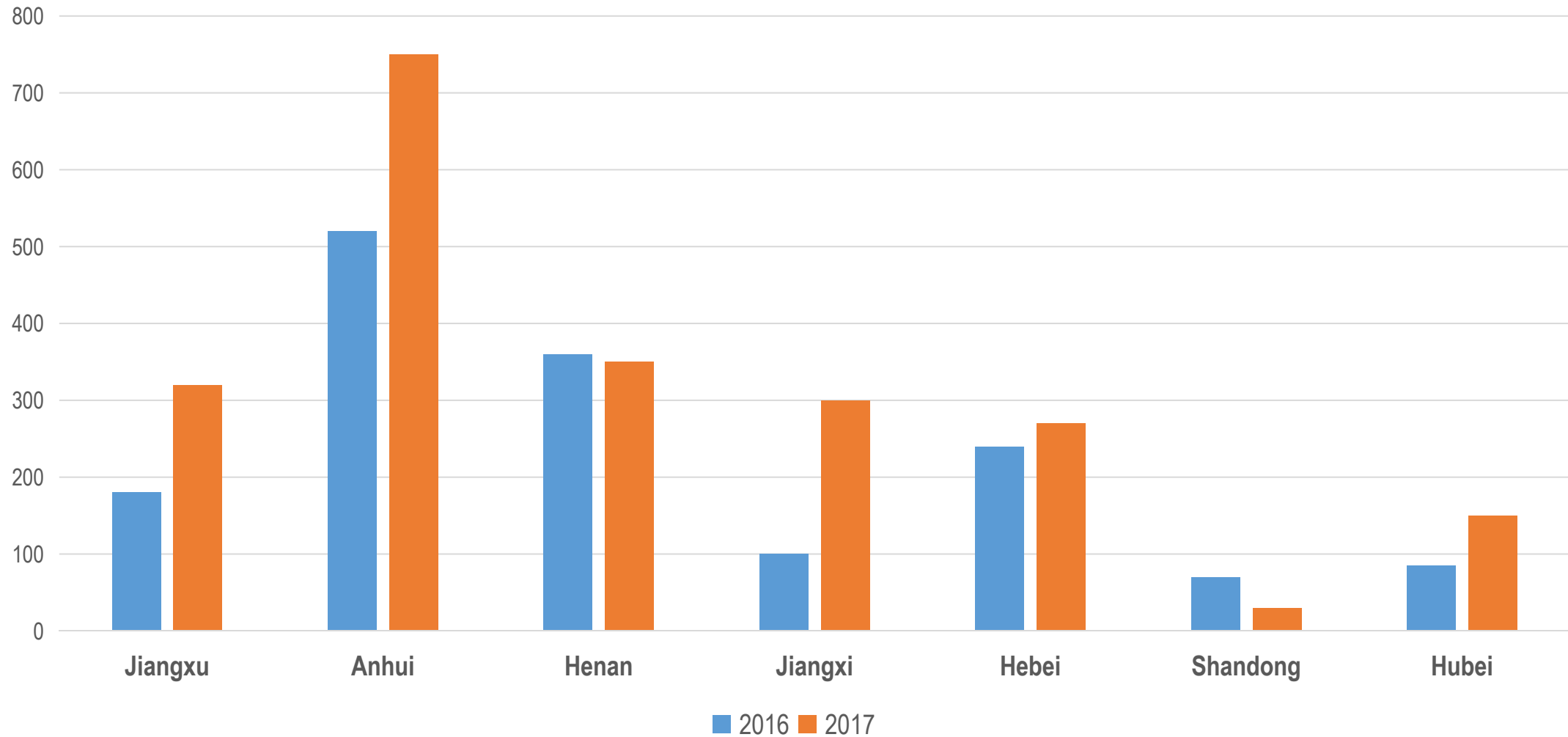
Source of lead-acid battery scrap	Pb content	Impurities	Lead bullion	Sourcing area	Utilisation rate
Electric bikes	63.5%	Silver, sulphur	Soft lead	Anhui, Jiangsu, Jiangxi	40%
Automobiles (white shell)	59%	Antimony, sulphur	Hard lead	Henan, Hebei, Hubei	35%
Automobiles (black shell)	58%	Antimony, sulphur	Hard lead	Hebei, Guangdong	25%

Most licensed secondary lead bullion smelters are located in Anhui and Henan, while Jiangxi is home to most unlicensed smelters

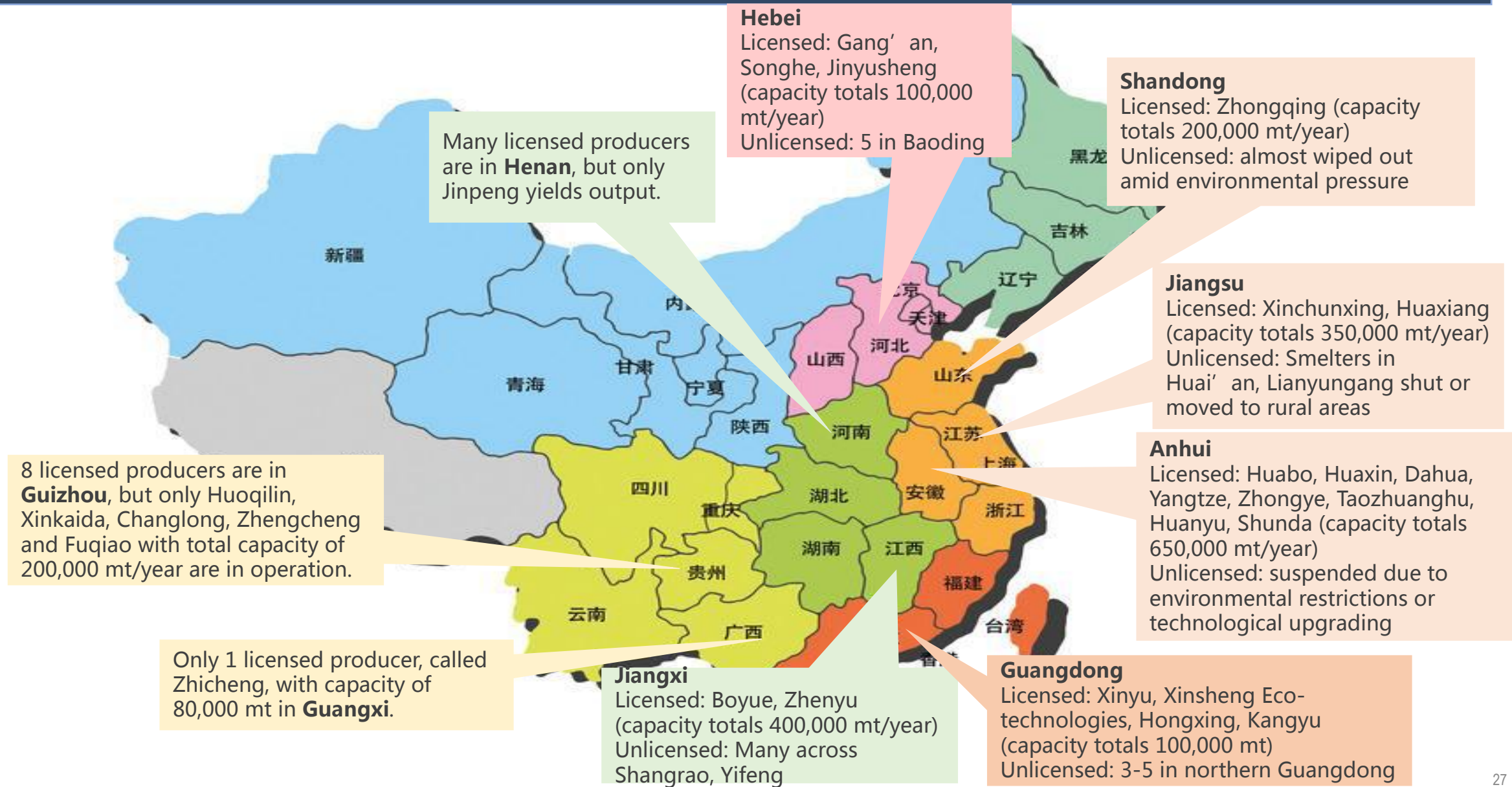


Secondary lead bullion producers are mostly located in Jiangsu, Anhui, Henan, and Jiangxi etc., and production in Anhui and Jiangxi grew sharply

Secondary lead bullion production in 2016-2017 (1,000 mt)

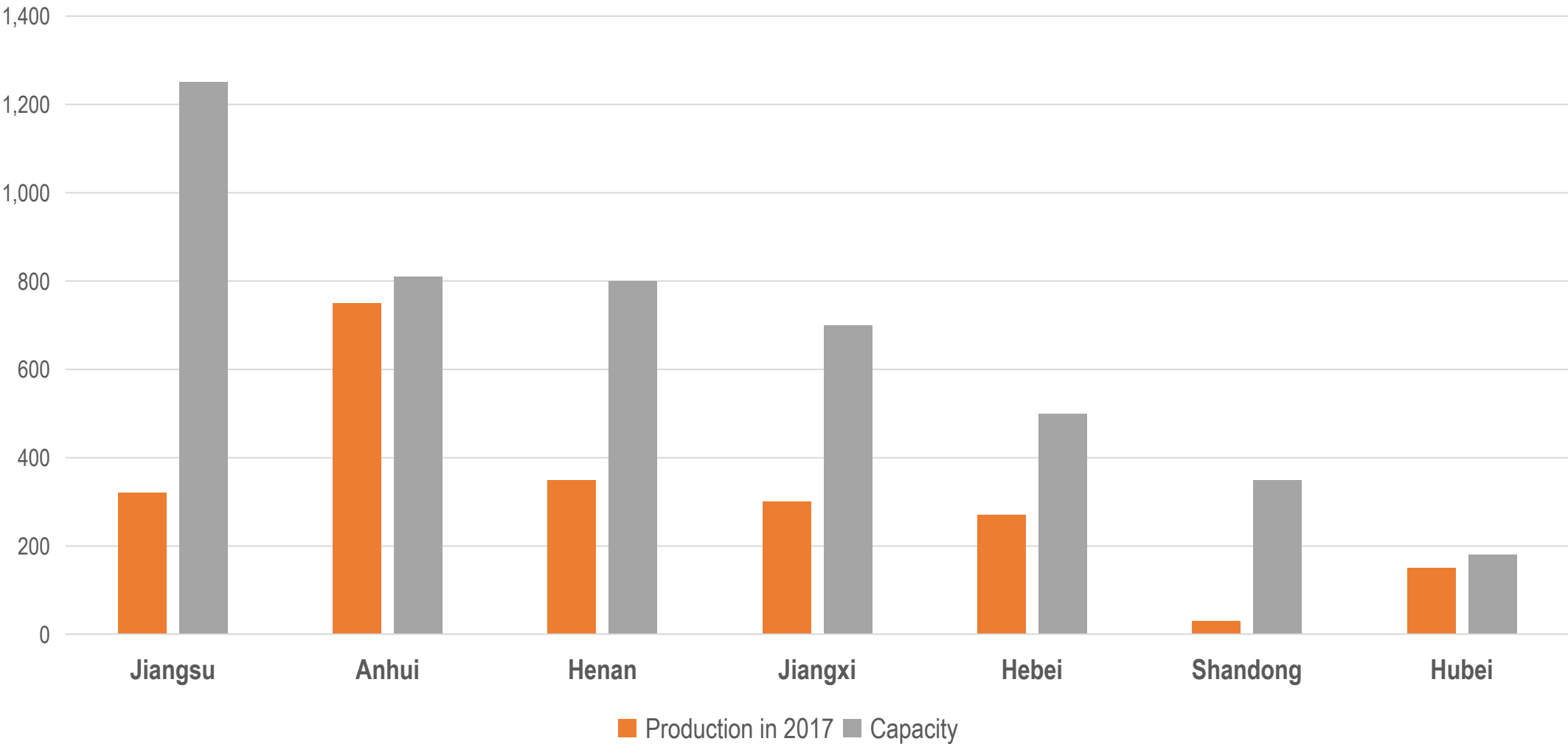


Most licensed secondary refined lead producers are located in Anhui and Guizhou, while Jiangxi is home to most unlicensed ones

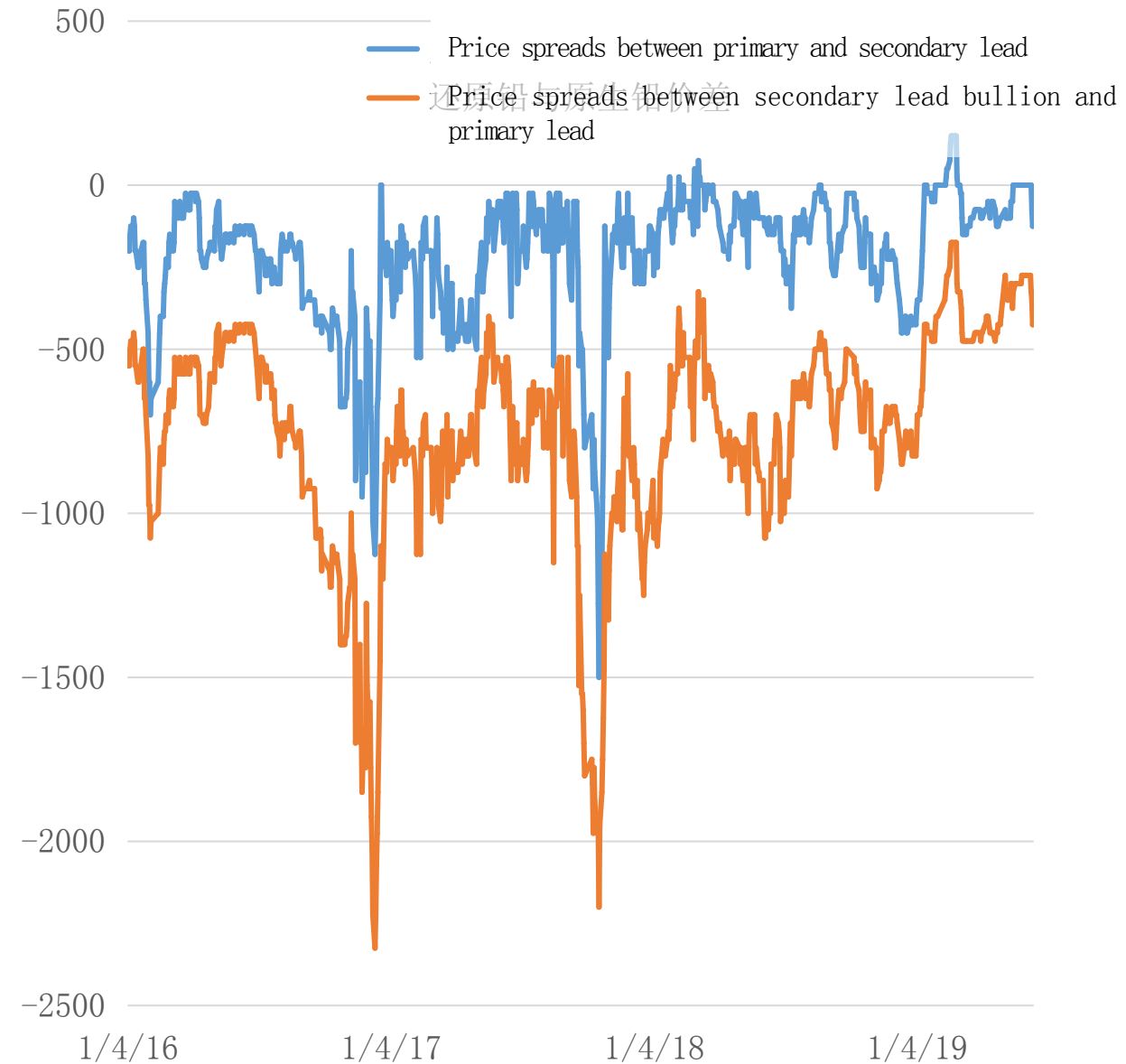
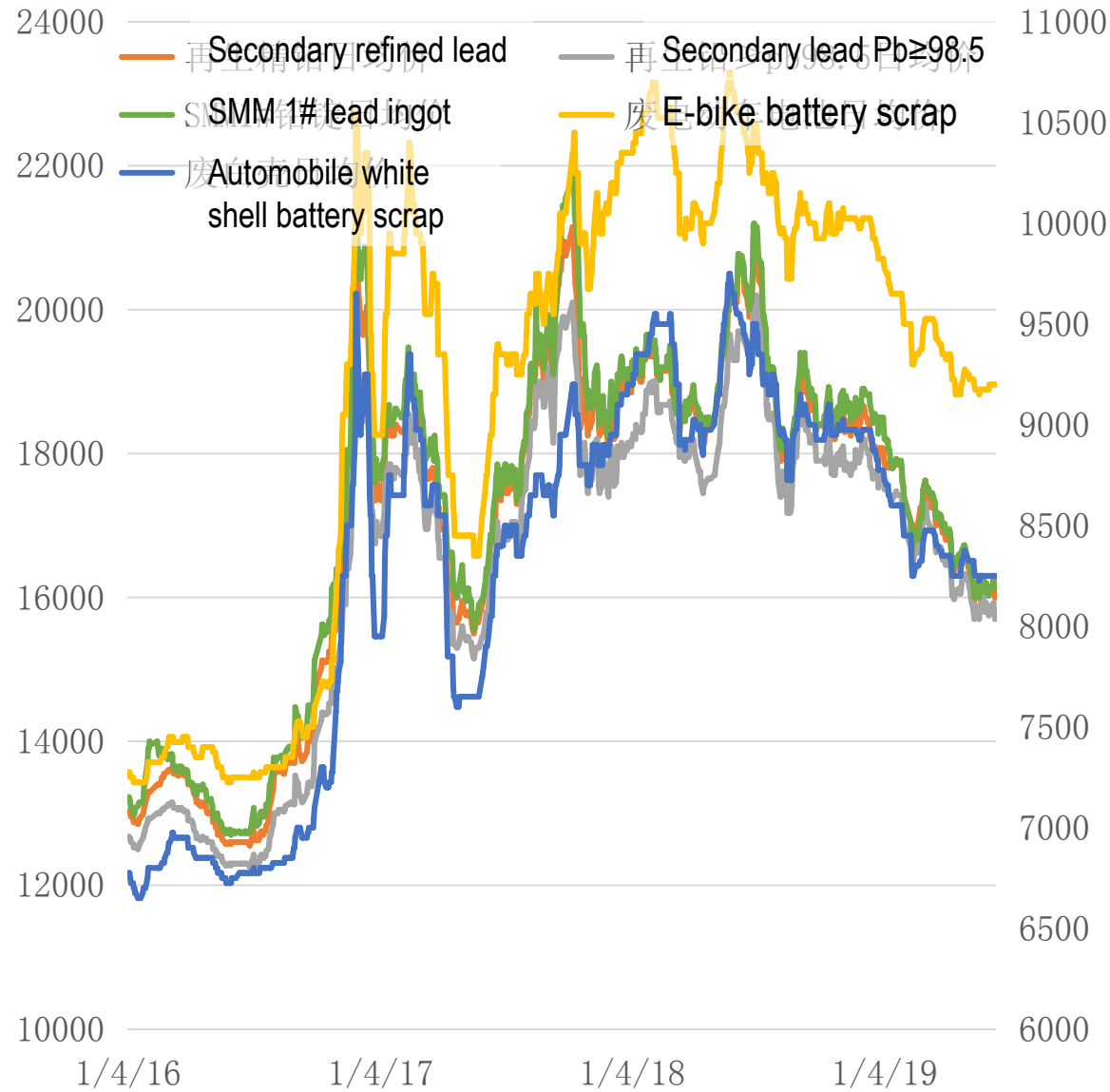


Producers in Anhui, Hubei close to full capacity, while operating rates across other regions stay low. This reflects a severe overcapacity issue.

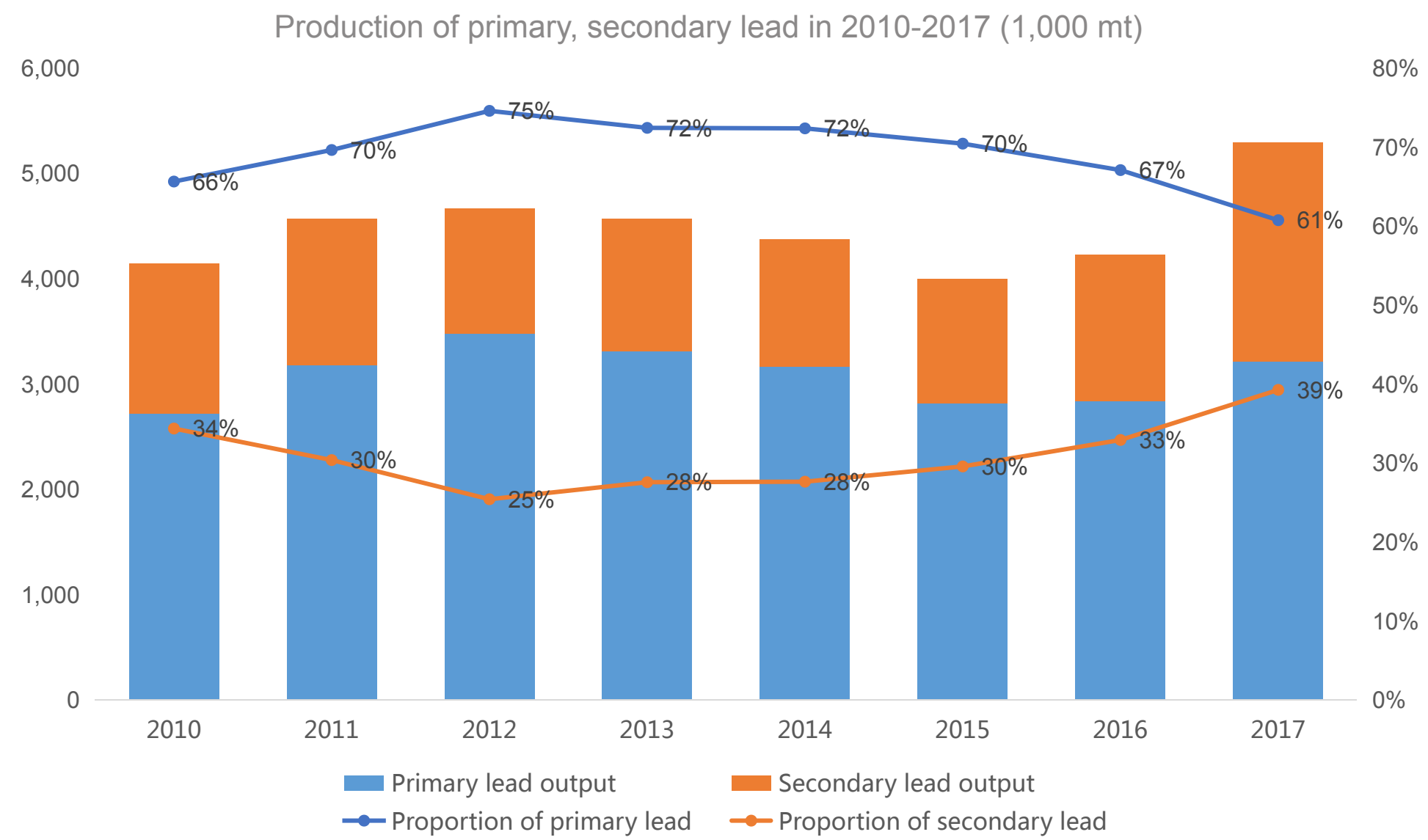
Secondary lead bullion production, capacity in 2017 (1,000 mt)



Price movement of primary, secondary lead, and lead-acid battery scrap shows a smaller price spread between lead-acid battery scrap and refined lead

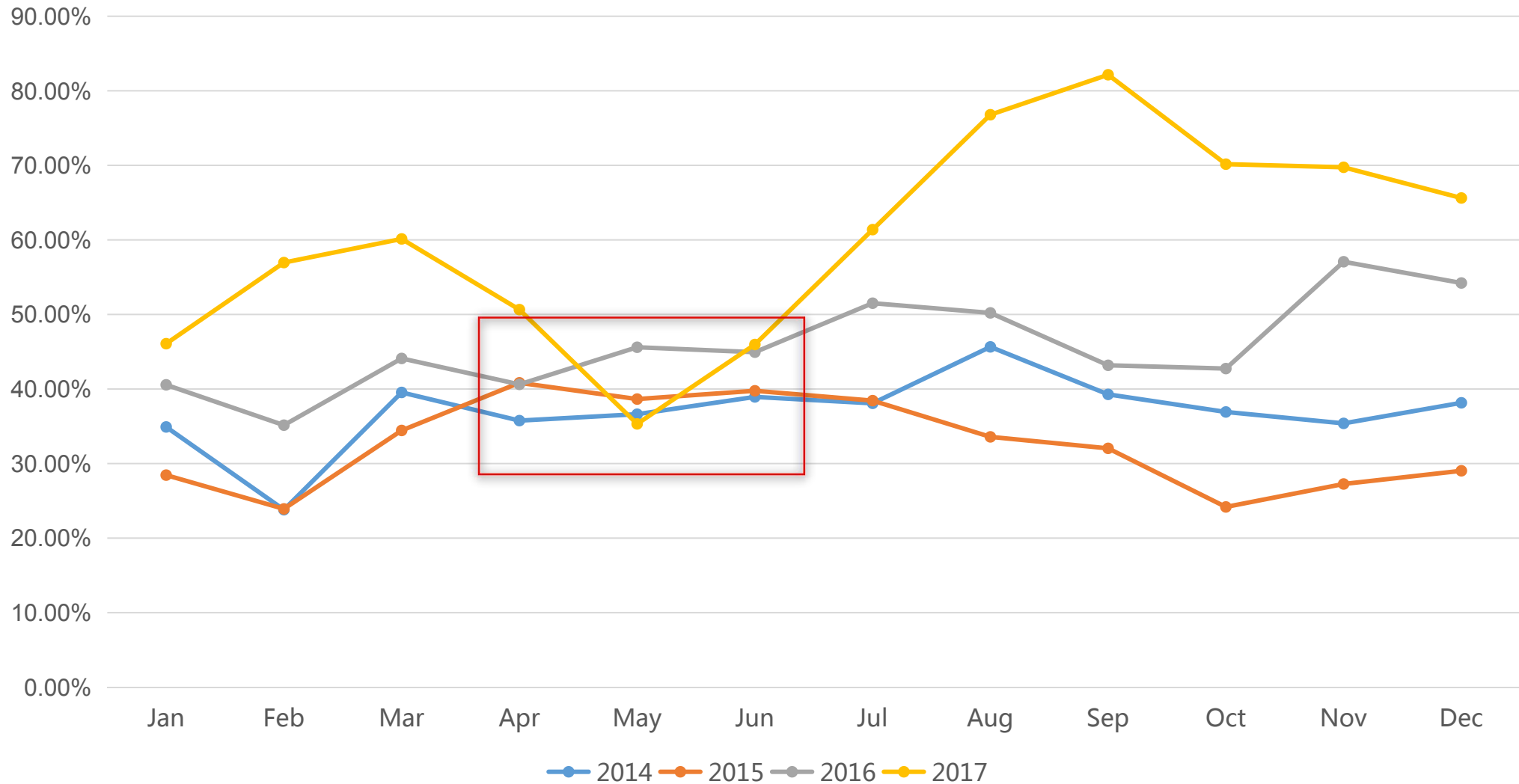


Rising secondary lead output indicates a production shift from primary lead to secondary lead



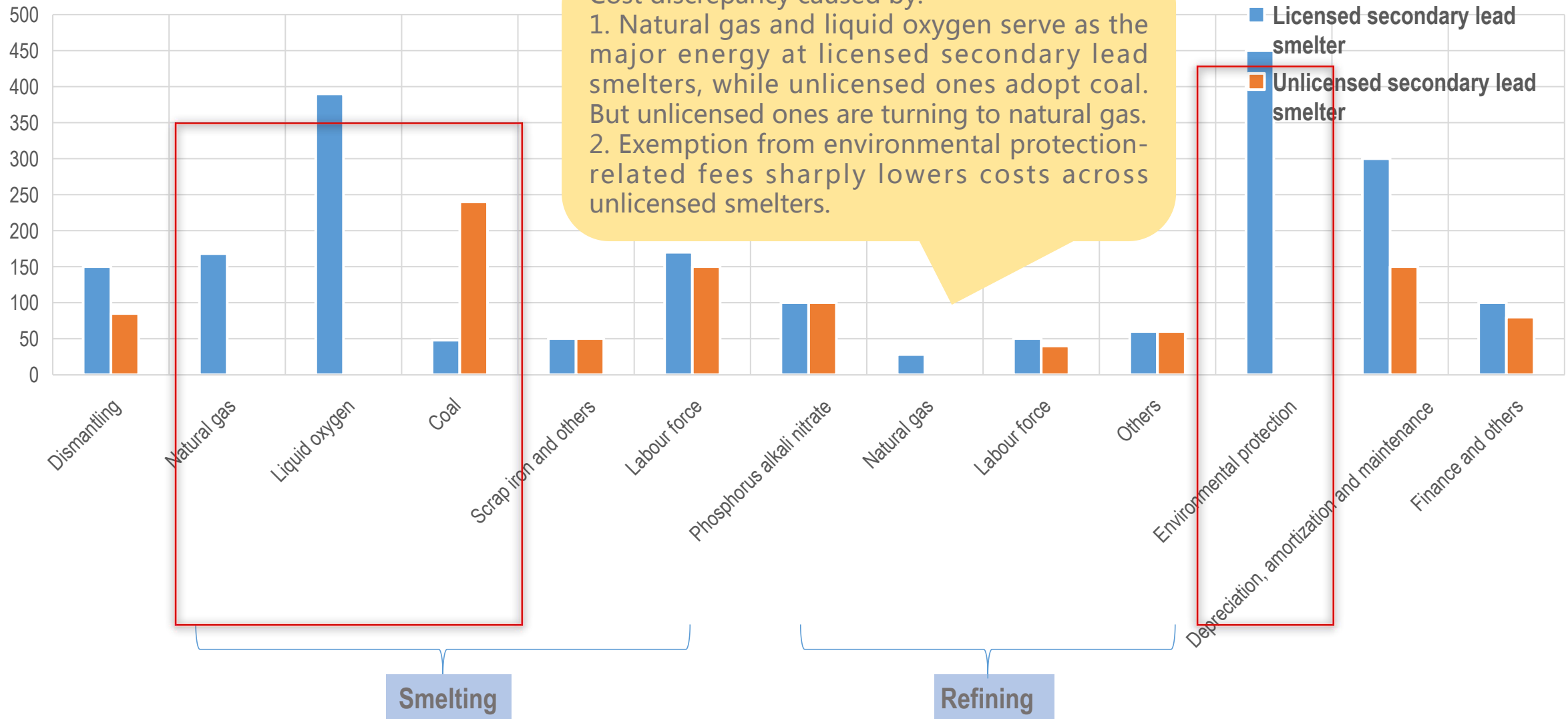
Operating rates across secondary lead smelters show seasonality, and are susceptible to prices. Rates rose year by year.

Monthly operating rates at secondary lead smelters in 2014-2017



Vast cost advantage relative to licensed ones results in expansion of unlicensed smelters

Cost discrepancy caused by:
1. Natural gas and liquid oxygen serve as the major energy at licensed secondary lead smelters, while unlicensed ones adopt coal. But unlicensed ones are turning to natural gas.
2. Exemption from environmental protection-related fees sharply lowers costs across unlicensed smelters.



SMM is a global portal with 500,000 registered users and sees some 200,000 daily visits. We are committed to providing clients with a diverse range of services, including transactions, safe payments, warehouse logistics monitoring, supply chain financing, big data, and marketing. We are also dedicated to establishing a global community of metal business firms.

SMM's Big Data Department comprises experts with significant industry experience and consulting professionals, who offer surveys, analysis, and strategy and management advice to clients in and beyond China. Our Big Data Department has been highly recognised by Chinese and foreign clients for its rigor.

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