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5 September 2014

Ms Joanne Reid
Director
Anti-Dumping Commission
c/o Australian Customs and Border Protection Service
Customs House
5 Constitution Avenue
CANBERRA ACT 2601

Dear Ms Reid

Dumping and Subsidisation of Silicon Metal exported from P R China to Australia

Simcoa Operations Pty Ltd ("Simcoa") has reviewed the recently published Linan Group Exporter Visit Report and the Anti-Dumping Commission's ("the Commission") preliminary determination of dumping margins for the sole cooperative Chinese silicon metal exporter.

Simcoa is alarmed that the Commission has been unable to conclude that the Government of China ("GOC") significantly influences the cost of production inputs that account for more than 60 per cent of the production cost of silicon metal (and subsequently the selling prices for silicon metal). It is also of concern to Simcoa that the Commission has not taken full account of the broad range of GOC policies and regulations that impact the production and supply of silicon metal produced in China.

This submission evidences information available in the public domain that has permitted administrations in other jurisdictions (notably, the Canadian Border Services Agency ("CBSA") in its November 2013 findings) to conclude that Chinese domestic selling prices are impacted by the decisions of the GOC that are directly related to the Chinese ferroalloy and silicon metal industry.

Simcoa recommends that the Commission determine that silicon metal prices in China are artificially low, such that a market situation for silicon metal in China prevails rendering selling prices not suitable for normal value purposes. Simcoa proposes that normal values for Chinese producers be determined on a constructed basis, reflecting market prices for key inputs electricity and coal.

Simcoa will provide the Commission with a separate submission addressing countervailable subsidies available to silicon metal producers in China.

If you have any questions concerning this submission, please do not hesitate to contact me on (08) 9780 6762, or Simcoa's Representative, John O'Connor on (07) 3342 1921.

Yours sincerely

David Miles
Vice President
Site Services and Marketing

Introduction

Simcoa Operations Pty Ltd ("Simcoa") has previously written to the Commission demonstrating that a market situation exists in the People's Republic of China ("China") for silicon metal sold domestically[1]. Simcoa does not retreat from this position. Simcoa's stance is supported by the recent Canadian Service Border Agency (("CBSA") decision that Chinese exports of silicon metal were exported to Canada with dumping margins of 190.1 per cent and subsidization margins of 21.1 per cent.

The Anti-Dumping Commission ("the Commission") has conducted an exporter verification visit with a cooperative exporting group of companies in China - the Fujian Linan Group (that includes Xiamen K Metal Co., Ltd, Hua'an Linan Silicon Industry Co., Ltd, and Guizhou Liping Linan Silicon Industry Co., Ltd). It is understood that the two manufacturing facilities that produce the silicon metal exported to Australia are the Hua'an Linan facility located in Fujian province, and Guizhou Liping Linan located in Guizhou province.

Following verification, the Commission has preliminarily concluded that exports of silicon metal to Australia were not dumped and that it could not *"conclude that a countervailable subsidy is being provided in the form of reduced electricity rates"* to the two Linan Group manufacturing facilities.

The Linan Group exports via its related trading entity Xiamen K Metal Co. Ltd ("K Metal"). Simcoa considers that the preliminary findings of the Anti-Dumping Commission ("the Commission") reflect a situation that selling prices in China cannot be relied upon as the basis for normal values due to the significant government influence over the sector. This impact is through is evident via policies that apply to the ferroalloy sector, and influence on key inputs to the sector. Administrations in the US, Europe and Canada have also confirmed this to be the case in investigations over the last two decades. Each administration has assessed normal values for silicon metal on the basis of surrogate information in an alternate "market" economy country (e.g. USA in the most recent CBSA investigation). Surrogate normal values have recently been considered necessary by CBSA as Chinese domestic selling prices for silicon metal are *"substantially determined by the GOC, and there is sufficient reason to believe that the domestic prices of silicon metal are not substantially the same as they would be in a competitive market"*.

Simcoa is troubled by the Commission's preliminary finding concerning a sole exporting entity of silicon metal to Australia. Administrations in other jurisdictions have concluded that Chinese selling prices cannot be relied upon for normal value purposes. Simcoa agrees with these findings. It is critical that the Commission does not accept government-influenced selling prices and input costs in its proposed findings for a Statement of Essential Facts ("SEF") – either for the sole cooperative exporter, or all remaining exporters of the goods under consideration.

It is understood by Simcoa that normal values for silicon metal exported to Australia must be determined in accordance with Australia's legislative requirements. However, the information available to the Commission makes it clear that the government of China ("GOC") substantially influences raw material input costs (i.e. electricity and coal) for Chinese silicon metal manufacturers, as well as implementing policies that influence and guide the ferroalloy sector, resulting in artificially low prices for silicon metal in China.

The input costs of electricity and coal are important considerations in the Commission's assessment as to whether a *market situation* prevails for silicon metal sold in China. CBSA has concluded in its investigation that silicon metal manufacturers in China are the beneficiaries of subsidized electricity. In its application, Simcoa identified that silicon metal producers in certain Chinese provinces were the beneficiaries of electricity at reduced rates. The independent CRU information confirmed this to be the case. Additional information in this submission confirms that the GOC controls the price for electricity in

[1] Refer submission dated 23 May 2014.

China and via provincial governments there exists discretionary power to reduce prices to producers in the sector only (and not to broader industrial consumers).

Simcoa highlights the available public information that demonstrates GOC influence on electricity and coal prices in China. The GOC influence on these raw material inputs, in conjunction with the industry specific policies that impact the ferroalloy sector in China enable the Commission to conclude that a market situation for silicon metal in China exists. Chinese normal values for silicon metal, therefore, must be determined on a constructed basis, using surrogated costs for electricity and coal, or alternatively, on surrogate selling prices from a market economy country (e.g. USA).

Linan Group of companies

The Linan Group of companies manufacture silicon metal (currently via Hua'an Linan and Guizhou Liping Linan) and export to Australia via their affiliated exporter, Xinan K Metal Co.Ltd ("K Metal"), are located in separate provinces within China. The Commission was informed by the Linan Group that it has "five different" silicon metal manufacturing companies throughout China[2], with only two of the facilities producing silicon metal that is exported to Australia.

The Commission indicates in the Linan Group Exporter Visit Report that it verified Hua'an Linan's and Guizhou's electricity expense. The Commission stated[3]:

> *"We examined electricity payments made by Hua'an and Guizhou Linan during the investigation period. We compared the rate per kilowatt to a table of electricity tariffs provided by the Government of China for the relevant provinces. We noted that over the course of the investigation period Hua'an Linan paid a rate of RMB [rate redacted] per kilowatt, which is RMB [rate redacted] less than the table indicated. However, Guizhou Linan paid a rate of RMB [rate redacted] per kilowatt, which is RMB [rate redacted] per kilowatt higher than the maximum rate provided in the electricity scales table. We examined the electricity invoices, however, they did not provide any evidence of the basis of the rate applied or the category of electricity utilization. Based on the evidence provided we are unable to conclude that a countervailable subsidy is being provided in the form of reduced electricity rates."*

Simcoa submits that electricity and coal price sin China are the subject of Chinese government influence and that as a result the production cost of silicon metal is understated. As electricity accounts for 55 to 60 per cent[4] of the production cost of silicon metal, the impact of a reduced input cost on the overall silicon metal cost is substantial. It is therefore safe to conclude that due to the reduced input cost for electricity, silicon metal selling prices in China are suppressed and lower than they otherwise would be. For these reasons, Simcoa submits that a market situation applying in China for silicon metal.

Key inputs at less than adequate remuneration

Simcoa's application alleged that a market situation applies in China for silicon metal sold on the domestic market. It was asserted that certain raw material inputs – electricity and coal – were sold at less than adequate remuneration in China.

Electricity

Simcoa has previously indicated that the CBSA identified electricity as accounting for 55 to 60 per cent of the production cost of silicon metal. CBSA was satisfied that silicon producers in China sourced electricity from State Owned Enterprises ("SOEs"), that the SOEs were vested with governmental authority and that the electricity was supplied at less than fair market value.

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[2] Refer Fujian Linan Group Exporter Verification Report, P.8.
[3] Ibid, P. 36.
[4] CBSA Statement of Reasons, 5 November 2013, Paragraph 97.

Simcoa understands from a recently published paper by the Crawford School of Public Policy and The Australian National University[5] that the GOC continues to exercise control over domestic electricity tariffs. The June 2014 Paper specifically noted that "*Electricity tariffs have remained controlled by the central government since China split State Power Corporation and separated electricity generation from its transmission and distribution in 2002*". *ChinaAsia Daily* (26 May 2014) also confirmed that the GOC continues to "control" electricity prices[7], affirming the findings of CBSA in 2013.

In discussing the differentiated electricity tariffs in China, Wei and Zhang observed[8]:

> "*To shut down plants that are inefficient and highly polluting, and to keep the frenzied expansion of offending industries under control, NDRC (2006) ordered provincial governments to implement the differentiated tariffs that charge more for companies classified as "eliminated types' or 'restrained types' in eight energy-guzzling industries including cement, aluminium, iron and steel, and ferroalloy from October 1, 2006 onwards*".

As previously indicated, the production of silicon metal falls within the ferroalloy industry. However, Wei and Zhang confirmed that some provincial governments did not follow the central government's directives and continued to offer preferential power tariffs to some energy-intensive industries, "*because all the revenue collected from these additional charges goes to the central government*". This is evidenced by the low-priced electricity available in some provinces, including the high silicon production province of Yunnan.

From December 2013, the GOC has sought to expand a three-tiered pricing scheme for electricity into the aluminium sector. The higher the consumption, the higher the additional charges levied. It is reported that the three-tier scheme is to be broadened to include other industries (e.g. cement). The Wei and Zhang Report does not indicate that the additional charges hierarchy for high electricity consuming producers have been extended to the ferroalloy (or silicon) industry, hence it can be assumed that the provincial government's control of electricity prices to silicon producers remains.

China Silicon Metal Market Monthly (August 16, 2012[9]) confirms the government's role in the pricing of electricity in key silicon metal producing provinces. It is reported that in response to reduced demand for silicon metal and to assist in maintaining production in Fujian province, the local government reduced electricity rates in Samming City and Zhangzhou City (N.B. The cooperative producer Hua'an Linan Silicon Industry Co., Ltd is based in Zhangzhou City and would have been a beneficiary of the local government's price-reduction initiative).

China Silicon Metal Market Monthly also reports that Yunnan and Sichuan provinces implemented a series of price reductions in 2012 assist silicon metal producers.

The reported electricity price reductions are consistent with the CBSA's conclusions that silicon metal manufacturers in China receive beneficial rates for electricity consumption, specifically in Yunnan province where CBSA found that for one producer that purchased electricity from the State-owned Dehong Grid located in Dehong Prefecture, the electricity prices were "*substantially lower than the prices paid by enterprises operating in other industries in that same prefecture*[10]".

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[5] Wei, J. and Zhang, Z.X. (2014), Energy Prices, Subsidies and Resource Tax Reform in China, CCEP Working Paper 1406, June 2014. Crawford School of Public Policy, The Australian National University, at Non-Confidential Attachment 1.
[6] Ibid, P.8.
[7] Refer ChinaAsia Daily, 26 May 2014, Non-Confidential Attachment 2.
[8] Ibid, P.10.
[9] Refer China Silicon Metal Market Monthly, 16 August 2012, at Confidential Attachment 3).
[10] CBSA Statement of Reasons, 5 November 2013, P.12.

The China Silicon Metal Market Monthly Report indicates that the price reductions are for the silicon metal manufacturers only, in response to falling silicon metal prices and lower production rates, in order to protect profitability – and does not indicate the price reductions were applied to broader industries.

Antaike – The Leading China Metals Information Provider also confirmed the electricity price reductions in Yunnan Province in its media release dated 26 June 2012. References are clearly identifiable linking the electricity price reductions to weak silicon demand and pricing[11].

Simcoa submits that as the GOC determines and varies the price for electricity sold to high-consuming electricity manufacturers and provides electricity at a discount to other industries in China and, as electricity accounts for a significant proportion of the production cost of silicon metal, the Commission cannot determine normal values in China based upon market selling prices for silicon metal (that are artificially low due to the absence of demand and GOC influenced low electricity prices).

Coal

As with electricity, CBSA determined that coal prices in China are at less than market prices. Coal accounts for between 8 and 10 per cent of the production cost of one tonne of silicon metal. The CBSA accepted the Canadian Industry's claims that SOEs accounted for more than 60 per cent of total coal produced in China, and that the GOC exercises control over the coal industry through the use of "*policies, laws, regulations, production caps and production ceilings*" that impact supply and demand for coal in China.

Additionally, the GOC via MOFCOM restricts exports of coal from China through the use of annual quotas (to encourage domestic supply).

The CBSA Statement of Reasons also indicated that the GOC influenced the supply of coke "*a coal substitute and downstream product of coal*". The Commission has evidenced the GOC influence of coke and coking coal in Reports 190, 193 and 198.

It is evidenced, therefore, that coal prices in China are influenced by the GOC and are also at artificially low prices that impact the selling prices of silicon metal in China.

Recommended Benchmarks for electricity and coal prices

In its application for anti-dumping and countervailing measures, Simcoa calculated *prima facie* normal values relying upon independent CRU information for production costs in China. Simcoa demonstrated that the electricity prices in Yunnan province were approximately 32 per cent below electricity prices in other regions.(i.e. Guizhou).

CRU is a creditable, independent consultancy entity that examines silicon metal production economics annually. It is highly regarded in the industry, and is an authority on silicon metal production economics. On the basis that electricity prices to silicon producers in China are influenced by the GOC, it is proposed that the Commission surrogate the highest electricity price (as published by CRU for 2013) into the cooperative exporter's cost-to-make-and sell ("CTM&S") silicon metal to arrive at a constructed normal value for the Linan Group companies, and for the remaining Chinese exporters.

Similarly, the Commission can surrogate a coal price into the cooperative exporter's CTM&S. A coal price either from CRU or from published export prices for coal (e.g. from Australia) can be included in the constructed normal value.

A level of profit would also be applied to the constructed CTM&S. It is noted that profits for silicon metal producers in China have been eroded due to the reduced demand and decline in selling prices. The

[11] Antaike Media Release, 26 June 2012 at Non-Confidential Attachment 4.

Commission could utilize the profit verified in the Linan Groups verification visit for the Linan Group normal values. For the remaining Chinese exporters, the Commission could apply the level of profit achieved by Simcoa on its domestic sales in Australia.

Market Situation for silicon metal sold in China

Simcoa has indicated that the GOC has applied and implemented a broad range of policies impacting the ferroalloy industry in China. As indicated in its 23 May 2014 submission, Simcoa highlighted that the GOC influenced the sector through the application of a range of policies and influences including:

- a range of export control measures;
- influence on raw material input prices for silicon metal;
- policies and regulations impacting production levels and participants in the sector;
- restrictions on the use and supply of inputs; and
- impact on domestic selling prices for silicon metal.

The CBSA finding in late 2013 highlighted the GOC influence in each of the above areas. CBSA identified silicon as a metal included within the broader ferroalloy sector and was based upon industry publications – notably CRU and Metal Bulletin – identifying silicon metal pricing and market reporting as falling within the ferroalloy industry

Following the non-participation of the GOC in this investigation, regard must be made of the following GOC policies that impact the Chinese ferroalloy industry.

GOC Export Control Measures

Simcoa has previously highlighted that the GOC imposed a 15 per cent export tax on silicon exports. The measure was identified in the WTO Panel report "China – Measures Relating to the Exportation of Various Raw Materials". The export tax was removed on 1 January 2013, however, the GOC's selective nature of the tax impost highlights the GOC's willingness to readily exercise discretion to encourage/discourage exports.

The GOC does not permit a refund of the 17 per cent Value-Added Tax ("VAT") on exports of silicon. The non-refund of VAT discourages exports of silicon and encourages domestic sales (and thereby depresses the domestic selling prices in China with increased supply for the Chinese market).

Simcoa also referred[12] to the CBSA identified article by Platts in December 2012 that "China's Ministry of Commerce (MOFCOM) had granted licenses to 255 Chinese producers and trading companies to export ferroalloys. The ferroalloys subject of the licenses include "ferrosilicon".

The aim of the export controls was to limit exports of silicon metal and increase domestic supply. Silicon metal was considered a key product in a "pillar" industry in China. The export controls identified result in excess supply of silicon metal in China, suppressing domestic selling prices.

Government influence on the Price of Inputs used in Silicon manufacture

Simcoa has detailed above the GOC impact on electricity and coal prices in China. Electricity prices in some regions are 32 per cent below the highest GOC-influenced electricity price. Coal prices are also influenced by the GOC.

[12] Refer Simcoa submission dated 23 May 2014.

GOC policies aimed at influencing silicon production

Simcoa included in its application a copy of the "National Industrial Policy of the Chinese Ferroalloy Industry" published by the National Development and Reform Commission ("NDRC") dated 15 June 2011 that specifically includes silicon within the ferroalloy sector, to which the GOC policies apply.

The document identifies the need for structural reform in the ferroalloys industry, particularly referencing the elimination of "backward production capacity".(i.e. production capacity below 6,300KVA). In its 23 May 2014 submission, Simcoa referred to the document published by the Yunnan government "*Document of the Office of the People's Republic of Yunnan Province (Yun Zheng Ban Fa [2012] No 236) – Opinions concerning Promoting Industrial Restructuring of Industrial Silicon*". The CBSA indicates the document refers to the restructuring of overcapacity in industries including silicon metal. CBSA states that the document refers to "... a number of statistics relating to the production and sales of silicon metal by producers in Yunnan [province] during 2011 as well as a number of problems concerning silicon metal production such as redundant production capacity, high resource and energy consumption, pressure on the environment, low industry concentration, and low equipment levels. The document also specifies a number of measures to be used to address the problems identified".

The Yunnan Province document referred to by CBSA is consistent with the matters addressed in the NCDC's "National Industrial Policy of the Chinese Ferroalloy Industry".

CBSA also confirmed the GOC's efforts (via the Yunnan Province notification) to eliminate backward production (as evidenced also in the NCDC document).

CBSA also identified limitations on silicon production capacities for certain producers so that Yunnan province's production is "capped" at 1.4 million tons.

The CBSA was therefore satisfied that the GOC had implemented a number of controls to reduce production capacity for silicon metal in China during the period of investigation and that the controls were planned to continue to 2015[13]. CBSA also considered that the GOC was "restricting access to the silicon metal industry" for new entrants. This was evidenced in the Yunnan Province' plans for control of the industry[14].

The CBSA also highlighted the impact of a number of the GOC's Five-Year Plans impacting on the Ferroalloy Industry in China, including:

- 12th Five-Year Development Plan for the Non-Ferrous Metals Industry which includes the sub-plan, the 12th Five-Year Development Plan for the Aluminium Industry;
- 12th Five-Year Development Plan for the New Materials Industry;
- 12th Five-Year Development Plan for the Oil & chemicals Sector;
- 12th Five-Year Plan for the Raw Materials industry;
- 12th Five-Year Plan for the Further Promoting the Economy of the Western Regions;
- 12th Five Year Plans for the provinces and provincial cities: Chongqing, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, and Heilongjiang.

The GOC did not cooperate with the CBSA inquiry. The CBSA was able to confirm in the US Geological Survey 2011 Minerals Yearbook that the GOC's aim was to eliminate backward production capacity. The GOC sought to eliminate electric arc furnaces with a 6,300 kilovoltampere (KVA) capacity by the end of 2012[15]. CBSA was also able to confirm a list of ferroalloy enterprises required to eliminate

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[13] Refer CBSA Statement of Reasons, Certain Silicon Metal originating in or exported from the People's Republic of China, 5 November 2013, P. 21.
[14] Ibid, P.22.
[15] Ibid, Paragraph 115.

production capacity as published by the Ministry of Industry and Information ("MIIT")[16] in 2010 and 2011. CBSA was able to identify from MIIT lists and the Canadian Applicant Industry's list of Chinese exporters of silicon metal, the names of silicon metal producers and exporters. The GOC had issued directives for the elimination of smaller silicon metal producers so that it could enforce a rationalization of the Chinese silicon metal industry.

Further GOC impositions concerning restructuring of the Chinese silicon metal industry in Yunnan province were also identified by CBSA. This includes the identification of a document titled "Document of the Office of the People's Government of Yunnan Province (Yun Zheng Ban Fa [2012] No. 236 – Opinions Concerning Promoting Industrial Restructuring of Industrial Silicon"[17]. CBSA indicated that this document had been prepared by the Yunnan government in accordance with the requirements of "Circular of the State Council on Accelerating the Structure Adjustment of the Industries with production Overcapacity (Guo Fa [2006] No.11).

Consistent with consolidation in the steel industry, the GOC has enforced backward integration on outdated production capacity in the ferroalloy (including silicon metal) industry.

Restrictions on the Use and Supply of Inputs

Simcoa has also highlighted the CBSA's findings concerning restriction on inputs as identified in the Yunnan Government's "Opinions Concerning Promoting Industrial Restructuring of Industrial Silicon". These include:

- the government will restrict the energy consumption per unit of silicon product as 12,000 kwh or less;
- restrict comprehensive energy consumption per unit of product at 3,500 kg of standard coal or less;
- restrict carbonaceous reducing agents consumption per unit of product at 1,300 kg or less (including restrict unit consumption of actual charcoal at 99 kg or less);
- achieve silicon recycle rate at 85% or above;
- achieve waste heat utilisation rate for industrial silicon electric furnaces at 70% or above;
- realise waste water recycling internally; and
- achieve complete recycling of micro-silica dust.

The impact of these directions further highlights the intrusion of the GOC into the ferroalloy sector in China.

Chinese domestic selling prices for silicon

The CBSA contrasted domestic prices in the US market for silicon as reported by Metal Bulletin, Platts Metals Week, Ryan's Notes and CRU and contrasted these with published Chinese domestic prices. On average, CRU prices indicated that Chinese domestic prices were 37 per cent below US domestic prices during the period of investigation (i.e. 2012).

Market Situation for silicon metal in China - Recommendation

It is submitted by Simcoa that the GOC exercises considerable influence over the ferroalloy industry in China and, specifically, producers of silicon metal. The level of influence is significant to impact the operation and production capacities of silicon metal manufacturers in China, and is also material in terms of reducing raw material input prices below market-determined prices, rendering the input prices artificially low.

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[16] Ibid, Paragraph 116.
[17] Ibid, Paragraph 119.

The impact of the government influence/intervention on Chinese domestic silicon metal prices has been to depress and suppress Chinese domestic selling prices so that they are approximately 37 per cent below US market prices (in 2012). The GOC influence also extends to export controls that impact the volumes and prices of Chinese-produced silicon metal.

Simcoa has demonstrated that administrations in other jurisdictions (including, most recently, CBSA in Canada) have confirmed and are satisfied that the GOC through a broad range of policies and influences has caused Chinese silicon metal prices to be lower than they otherwise would be. These GOC influences have caused input prices for silicon metal producers to be artificially low, resulting in a market situation finding for silicon metal. The impact of the GOC influences is to render Chinese domestic selling prices "unsuitable" for normal value purposes.

Simcoa proposes that the Commission construct normal values for Chinese silicon metal producers that reflect market prices for key inputs electricity and coal. This would ensure that normal values for Chinese producers reflect market costs of production for silicon metal.

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Crawford School of Public Policy

Centre for Climate Economic & Policy

Energy Prices, Subsidies and Resource Tax Reform in China

CCEP Working Paper 1406
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Abstract

The Chinese leadership in November 2013 determined to embark upon a new wave of comprehensive reforms in China. This is clearly reflected by the key decision of the Third Plenum of the 18th Central Committee of Communist Party of China to assign the market a decisive role in allocating resources. To have the market to play that role, getting the energy prices right is crucial because it sends clear signals to both producers and consumers of energy. While the overall trend of China's energy pricing reform since 1984 has been moving away from the pricing completely set by the central government in the centrally planned economy towards a more market-oriented pricing mechanism, the pace and scale of the reform differ across energy types. This paper discusses the evolution of price reforms for coal, petroleum products, natural gas and electricity in China, provides some analysis of these energy price reforms, and suggests few areas of reforms could take place in order to have the market to play a decisive role in allocating resources and to help China's transition to a low-carbon economy.

Keywords
Energy prices; Tiered prices; Differentiated tariffs; Subsidies; Coal; Electricity; Natural Gas; Petroleum products; Resource taxes; Desulfurization and denitrification; State-owned enterprises; China.

JEL Classification
H23; H71; O13; O53; P2Q41; Q43; Q48; Q53; Q58.

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1. Introduction

Before the post-1978 economic reform, China's economic management structure was modeled principally on that of the former Soviet Union, an essential feature of which was the adoption of a united state pricing system. Under this pricing system, the state-set prices of goods, including those of energy, did not reflect neither the production costs nor the influence of market forces. The structure of state-set prices was also irrational: the same type of goods was set at the same prices regardless of their qualities, thus resulting in the underpricing and undersupply of goods of high quality. Over a very long period, this pricing system remained unchanged so that its inflexible and restrictive nature became increasingly apparent. Thus, the outdated pricing system had to be changed.

In 1984, the government required state-owned enterprises (SOEs) to sell up to a predetermined quota at state-set prices but allowed to sell above the quota or surplus at prices within a 20 percent range above the state-set prices. In February 1985, the 20 percent limit was removed and prices for surplus could be negotiated freely between buyers and sellers (Wu and Zhao, 1987). At that point, the dual pricing system was formally instituted. Such a pricing system introduced, among others, economic efficiency in the use of resources and was generally considered a positive, cautious step towards a full market price.[1]

Table 1 presents some data on plan and market prices as well as data on plan allocations from a survey of 17 provincial markets. It can be seen that after four years of introducing the dual pricing system there had continued to rely heavily on the plan in the allocation of energy goods, particularly crude oil and electricity. This means that SOEs still received allocation for part of their energy inputs at the state plan prices. As shown in Table 1, however, the sate-set plan prices of energy goods were kept much lower than their market prices. As a result, these enterprises have weak incentive for investment in energy conservation.

Confronted with energy shortage and insufficient energy conservation investment, China has been reforming its energy prices as part of sweeping price reforms initiated in 1993. The pace and scale of the energy pricing reform differ across energy types. This paper discusses the evolution of price reforms for coal, petroleum products, natural gas and electricity, provides some analysis of these energy price reforms, and suggests few areas of reforms could take place in order to have the market to play a decisive role in allocating resources.

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[1] See Wu and Zhao (1987) and Singh (1992) for general discussion on pros and cons of the dual pricing system and Albouy (1991) for its impact on coal.

Table 1

Ratio of market price to plan price, and percentage of plan allocation of selected goods by volume and value, March 1989

Selected goods	Ratio of market price to plan price	Percentage of plan allocation by volume	Percentage of plan allocation by value
Crude oil	3.13	80	56
Heavy oil	2.60	41	13
Copper	2.50	17	7
Coal	2.49	46	21
Gasoline	2.25	64	44
Aluminum	2.24	28	15
Fertilizer	2.23	39	26
Timber	2.12	22	12
Diesel fuel	2.05	55	36
Steel products	2.05	30	19
Electric power	1.89	75	60
Nitric acid	1.82	40	20
Soda ash	1.81	40	28
Plate glass	1.63	41	29
Aluminum products	1.63	6	4
Caustic soda	1.60	47	24
Kerosene	1.60	73	67
Copper products	1.49	8	5
Cement	1.36	16	11
Iron ore	1.33	78	74
Pesticide	1.33	62	54
Sulphuric acid	1.30	40	32
Crude salt	1.23	86	83
Pig iron	1.10	47	42

Source: China Price, September 1990 (quoted in Zhang (1998)).

2. Coal prices

Coal dominates in China's energy mix, accounting for 65.7 percent of total energy use in 2013. Its price has been set differently since 1993, depending on its use. Under a two track system for coal prices, the price of coal for non-utility use, the so-called "market coal", has been determined by the market, whereas the price of coal for utility use, the so-called "power coal", is based on "guiding price" that has been set by the National Development and Reform Commission (NDRC) substantially below market prices. Coal producers are required to sell to large power producers at the controlled prices for utility

coal (IEA, 2009). However, as the increasing portion of coal is used for utility and coal prices have risen over the years while power tariffs remained fixed, electricity generators found it increasingly difficult to obtain coal and cover the cost of generation (Rosen and Houser, 2007). In 2004, NDRC abolished its guiding price for power coal and set price bands for negotiations between coal producers and electricity generators. NDRC widened those bands in 2005; in 2006 it scrapped them altogether (Williams and Kahrl, 2008).

With electricity tariffs remaining controlled and flat, many electricity generators were unable to absorb the ensuing fuel cost increases and suffered huge losses. That increased the risk of power shortages. To respond to electricity generators' concerns, NDRC proposed in May 2005 a coal-electricity price "co-movement" mechanism that would raise electricity tariffs if coal prices rose by 5 percent or more in no less than six months and allowed electricity generators to pass up to 70 percent of increased fuel costs on to grid companies, and grid companies to pass costs on to consumers. However, because of fears of inflation, the co-movement policy had not been implemented as the conditions met, and power tariffs continue to remain flat while coal prices rise (Li, 2009; Williams and Kahrl, 2008; Fisher-Vanden, 2009). This had put greater pressure on electricity generators and led to lobbying efforts on the part of generators to receive higher tariffs.

In December 2012, the State Council announced to abolish the two track system for coal prices. The price of coal for utility use will also be determined by the market just as the price of coal for non-utility use does. Moreover, it revises the coal-electricity price "co-movement" mechanism. Under the revised mechanism, electricity tariffs would be adjusted if fluctuations in coal prices go beyond by 5percent or more in 12 months and electricity generators are allowed to pass up to 90 percent of increased fuel costs on to grid companies instead of the existing 70 percent threshold (The State Council, 2012b). Given that electricity generators used to obtain coal at low prices and coal producers are facing sluggish demands, both coal producers and electricity generators are gradually adapting to each other under this changing market. As a reflection of the buyer market situation, pricing for annual contract for utility coal in 2014 between two sides of coal supply and demand has been very flexible, taking a multiple form on the yearly, quarterly or monthly pricing basis, which did not experience before (Hu, 2014).

3. Petroleum product prices

Domestic crude oil prices have tracked international prices since 1998, but this has not been the case with petroleum products. While China has since raised its producer prices

of gasoline and diesel several times, domestic oil refiners have still been feeling the pinch as crude oil prices have been since linked directly to international prices and thus have been allowed to rise, but refined oil product prices have not. To address this disconnect, the government has implemented since May 2009 the pricing mechanism whereby domestic petroleum product prices would be adjusted upward if the moving average of international crude oil prices based on the composited Brent, Dubai and Cinta crude oil price rose by more than 4 percent within 22 consecutive working days. Since its implementation, China adjusted domestic petroleum product prices 25 times, with upward adjustments 15 times and downward adjustments 10 times. However, this 22-working-day cycle of price adjustments has triggered wide complaints, as it often failed to reflect fluctuations in the international market.

To better reflect refiners' costs and adapt to fluctuations in global crude oil prices, NDRC launched in March 2013 a market-oriented petroleum product pricing mechanism. This new automatic pricing mechanism will shorten the current 22-working-day adjustment period to 10-working-day and remove the 4 percent threshold. The composition of the basket of crudes, to which oil prices are linked, will also be adjusted (Liu, 2012; Zhu, 2013). This new pricing mechanism means that China's retail prices will be subject to more frequent changes. Indeed, to the end of February 2014, or slightly less than one year since its implementation, China adjusted domestic petroleum product prices 17 times, with upward adjustments 8 times, downward adjustments 9 times and no adjustments 7 times (Jiang and Han, 2014). Clearly, this pace of adjustment is much frequent compared to the aforementioned pricing mechanism introduced in May 2009. These ups and downs of prices will better reflect the real cost of oil consumption and will benefit China's drive to save energy and abate emissions. However, this new pricing mechanism is just one step towards a more market-oriented petroleum product pricing mechanism. It is still not a complete liberalization of petroleum product prices because it does not enable to reflect the relationship between its domestic supply and demand.

4. Natural gas prices

Given coal-dominated energy mix, increasing a share of cleaner fuel, like natural gas, has been considered as the key option to meet the twin goal of meeting energy needs while improving environmental quality. However, natural gas price has long been set below the producers' production costs, and does not reflect the relationship between its supply and demand, or alternative fuel prices. This has not only led Chinese domestic gas producers to be reluctant to increase investments in production, but also has constrained the imports

of more costly natural gas from abroad. On June 1, 2010, China increased domestic producer price of natural gas by 25 percent (Wan, 2010). Since July 10, 2013, China raised natural gas prices for non-residential users based on a two-tiered approach. Under this reform, NDRC sets caps on city-gate gas prices for different provinces, instead of setting the ex-factory prices for domestic onshore and imported piped gas, while consumers and suppliers are allowed to negotiate their specific prices as long as the prices do not exceed the ceilings. Moreover, a lower price is set for the 2012 consumption volume of 112 billion cubic meters, whose ceiling city-gate prices will not increase by more than RMB 0.4 per cubic meter. A higher price is set for any volumes above the 2012 consumption level. This price is pegged to 85 percent of the basket price of alternative fuels such as fuel oil and liquefied petroleum gas using 60 percent and 40 percent weight respectively. The 85 percent is lower than that of the 90 percent of the pilot scheme in Guangdong and Guangxi, resulting in an average city gate price of RMB 2.95 per cubic meter for any gas consumption exceeding the 2012 level. Overall, this price reform would raise the city-gate wholesale price of natural gas to a national average of RMB 1.95 per cubic meter from RMB 1.69 cubic meter (Xinhua Net, 2013). This would represent an increase of 15.4 percent. The government aims to steadily raise the lower tier prices so that both price bands converge to create a fully market-oriented gas price by 2015.

Given that residential natural gas prices have been capped at much lower levels than those for non-residential users, natural gas prices for residential users will undergo a gradual increase. On June 1, 2010, China increased domestic producer price of natural gas by 25 percent. On December 26, 2011, China carried out the pilot reform of natural gas pricing mechanism in Guangdong province and the Guangxi Zhuang Autonomous region. Widely considered as a breakthrough in China's natural gas price reform, this reform changes the existing cost-plus pricing method to the "netback market value pricing" approach. Under this new pricing mechanism, pricing benchmarks are selected and are pegged to prices of alternative fuels that are formed through market forces to establish price linkage mechanism between natural gas and its alternative fuels. Gas prices at various stages will then be adjusted accordingly on this basis (NDRC, 2011). This new mechanism, which has been widely adopted in Europe, will better trace and reflect market demand and resource supplies, as well as guiding reasonable allocations. Provinces like Jiangsu, Henan and Hunan have implemented tier-tariffs for household use of natural gas. NDRC announced in March 2014 to lunch this pricing mechanism across the whole country before the end of 2015. The new pricing mechanism will set three pricing bands associated with three tier levels of consumption, with the first covering 80

percent of the average monthly consumption volumes for household users, and the second the next 15 percent. The third tier would cover any consumption above 95 percent of the monthly household average. Consumption at the second and third tiers will be accordingly charged at 120 percent and 150 percent of the first tier price (China Economic Net, 2014). Based on the guidance and taking its own circumstance into account, each province will determine the consumption volume at each tier level.

These price reforms and the aforementioned pilot scheme in Guangdong and Guangxi help to establish a market-oriented natural gas pricing mechanism that fully reflects demand and supply conditions. Gao et al. (2013) argue that it is feasible to implement the Guangdong and Guangxi pilot reform program to the entire country, with some adjustments and improvements regarding the choice of alternative fuels, the selection of the pricing reference point and the creation of netback market value pricing formula.

5. Electricity tariffs

Electricity tariffs have remained controlled by the central government since China split State Power Corporation and separated electricity generation from its transmission and distribution in 2002. While electricity tariffs were raised few times under the aforementioned coal-electricity price "co-movement" mechanism, they still remain flat. Facing the daunting challenges to cut emissions and strengthen industrial upgrading, the government has offered power price premium for desulfurization and denitrification, and has charged differentiated power tariffs and tiered power tariffs.

5.1 Power price premium for desulfurization and denitrification

With one-third of China's territory widely reported to be affected by acid rain, reducing SO_2 emissions has been the key environmental target in China. In its economic blueprint for 2006 to 2010, China incorporated for the first time the goal of reducing SO_2 emissions by 10 percent by 2010. With burning coal contributing 90 percent of the national total SO_2 emissions and coal-fired power generation accounting for half of the national total, the Chinese central government has mandated that new coal-fired units must be synchronously equipped with a flue gas desulphurization (FGD) facility and that plants built after 1997 must have begun to be retrofitted with a FGD facility before 2010.

To address unprecedented environmental pollution and health risks across the country, electricity generators are mandated to install flue gas denitrification facility as well during the 12^{th} five-year period running from 2011 to 2015. All coal-fired plants

with unit capacity of 300 megawatt (MW) or more across the country and with unit capacity of 200 MW in eastern part of the country and the capitals of other provinces or equivalent are mandated to install denitrification facility. By 2015, all flue gas desulfurization and denitrification facility installed needs to achieve the overall desulfurization rate of 95 percent and the denitrification rate of at least 75 percent in order for the power industry to cut SO_2 emissions by 16 percent and NOx emissions by 29 percent by 2015 relative to 2010 levels (The State Council, 2012a).

While electricity tariffs remain controlled and flat, the government offered since 2004 a 0.015 RMB/kWh premium for all new coal-fired units. Given that China's SO_2 emissions in 2005 were mandated to keep at the 2000 level but actually were 5 percent more than the 2000 level, the government decided to extend since 2007 a 0.015 RMB/kWh premium to electricity generated by existing coal-fired power plants (that is, those built before 2004) with FGD facility installed to encourage the installation and operation of FGD facility at large coal-fired power plants (NDRC and SEPA, 2007). The premium was equivalent to the average estimated cost of operating the technology. Other policies favorable to FGD-equipped power plants are implemented, e.g., priority given to be connected to grids, and being allowed to operate longer than those plants that do not install desulphurization capacity. Some provincial governments provide even more favorable policies, leading to priority dispatching of power from units with FGD in Shandong and Shanxi provinces. Moreover, the capital cost of FGD has fallen from 800 Yuan/kW in the 1990s to the level of about 200 Yuan/kW (Yu, 2006), thus making it less costly to install FGD facility. As a result, newly installed desulphurization capacity in 2006 was greater than the combined total over the past 10 years, accounting for 30 percent of the total installed thermal (mostly coal-fired) capacity. By 2011, the coal-fired units installed with FGD increased to 630 gigawatt (GW) from 53 GW in 2005. Accordingly, the portion of coal-fired units with FGD rose to 90 percent in 2011 of the total installed thermal capacity from 13.5 percent in 2005 (Sina Net, 2009; CEC and EDF, 2012). Based on the SO_2 emissions data from 113 cities at the prefecture level from 2001 to 2010, Shi et al. (2014) found that with this price premium for desulfurization when the number of power plants in a city increases by one, the SO_2 reduction rate increases by 0.998 percent, the amount of SO_2 reduction increases by 3.5 percent, and the amount of emission decreases by 1.2 percent. As a result of this incentive compatible policy, by the end of 2009, China had cut its SO_2 emissions by 13.14 percent relative to its 2005 levels (Xinhua Net, 2010), having met the 2010 target of a 10 percent cut one year ahead of schedule.

The government also offered since November 2011 a 0.008 RMB/kWh premium for electricity generated by power plants with flue gas denitrification facility in 14 provinces or equivalent. By the end of 2012, 27.6 percent of coal-fired units were installed with denitrification facility, with the average rate of denitrification facility of 48 percent (Zhang, 2014). With 72 percent of existing coal-fired units having not been equipped with denitrification facility, NOx emissions in 2012 rose, rather than reduced as mandated. Given this grim situation, since the beginning of 2013, the price premium for denitrification was extended to all coal-fired power plants equipped with denitrification facility (NDRC, 2013a), and was further increased to 0.01 RMB/kWh since September 2013 (NDRC, 2013b). In 2013, the coal-fired units installed with denitrification facility amounted to 190 GW, and NOx emissions were estimated to cut by 3.5 percent, the cut for the first time below 2010 reference levels (Zhang, 2014). Based on estimates by China Electricity Council, the average cost of denitrification is estimated to be 0.012 RMB/kWh for new plants and 0.015 RMB/kWh for plants already in operation. This cost can go beyond 0.020 RMB/kWh for some specially designated plants. To comply with the new NOx emissions standards of 100 mg/m^3 by July 1, 2014, only taking denitrification into consideration, retrofit costs for existing coal-fired units of 707 GW are estimated to be Yuan 200-250 billion. Factoring in new addition of coal-fired units of 250 GW over the period 2006-10, the yearly operation costs of denitrification facility to meet the new stringent standards are estimated to increase by Yuan 90-110 billion. This will significantly increase the generation cost of coal-fired units, which is estimated to increase by 20 percent in the short term (Li, 2013). Given the current level of price premium for denitrification, this raises the issue of whether all coal-fired units will install denitrification facility, and if installed, whether it will run continuously and reliably. Given that it is much more costly to install and run denitrification facility than FGD facility, and that field inspections reported that the installed FGD facilities are not in use or do not run continuously and reliably (Liu, 2006; Xu et al., 2009; Zhang, 2011, 2012), this can merit a great concern.

5.2 Differentiated power tariffs

To shut down plants that are inefficient and highly polluting, and to keep the frenzied expansion of offending industries under control, NDRC (2006) ordered provincial governments to implement the differentiated tariffs that charge more for companies classified as ‘eliminated types’ or ‘restrained types’ in eight energy-guzzling industries including cement, aluminum, iron and steel, and ferroalloy from October 1, 2006 onwards (see Table 2). While provinces like Shanxi charged even higher differentiated

tariffs than the required levels by the central government (Zhang et al., 2011), some provinces and regions have been offering preferential power tariffs to struggling, local energy-intensive industries. The reason for this repeated violation is the lack of incentive for local governments to implement this policy, because all the revenue collected from these additional charges goes to the central government. To provide incentives for local governments, this revenue should be assigned to local governments in the first place, but the central government requires local governments to use the revenue specifically for industrial upgrading, energy saving and emissions cutting (Zhang, 2007, 2010). In the recognition of this flaw, the policy was adjusted in 2007 to allow local provincial authorities to retain revenue collected through the differentiated tariffs, providing stronger incentives for provincial authorities to enforce the policy (Zhou et al, 2010). Partly for strengthening China's longstanding efforts to restructure its inefficient heavy industries, and partly faced with the prospect for the failure to meet the ambitious energy intensity target set for 2010, the NDRC and other five ministries and agencies jointly ordered utilities to stop offering preferential power tariffs to energy-intensive industries by June 10, 2010. Such industries will be charged with the punitive, differentiated tariffs. Those utilities that fail to implement the differentiated tariffs will have to pay a fine that is five times that of differentiated tariffs multiplied by the volume of sold electricity (Zhu, 2010).

Table 2
Differentiated power tariffs for eight energy-guzzling industries in China

		Existing additional charge (Yuan/kWh)	Additional charge since 1 October 2006 (Yuan/kWh)	Additional charge since 1 January 2007 (Yuan/kWh)	Additional charge since 1 January 2008 (Yuan/kWh)
Eight energy-guzzling industries	Eliminated types	0.05	0.10	0.15	0.20
	Restrained types	0.02	0.03	0.04	0.05

Source: NDRC (2006).

5.3 Tiered power tariffs

With residential electricity demand set to increase as income grows on the one hand and the price of residential electricity remaining below actual costs on the other hand, NDRC

implemented three-tier-tariffs for household electricity use. On July 1, 2012, 29 provinces in China abolished single-block, low prices and set up the new, three-tier tariffs for household electricity use. Under this new tariff system, the tier-one maintains the old quota price that applies to, on average, 89 percent of households of 29 provinces and the tier-two shifts to slightly higher electricity price for those electricity use exceeding the amount of basic use, which is differentiated across regions, with the tier-three set much higher tariffs for the amount of electricity for luxury use (People Net, 2012). The effectiveness of the new tariff mechanism depends on the price and income elasticities of residential electricity demand among income groups. However, very little information exists in China regarding these parameters. Based on the monthly micro-level data of Beijing urban households from 2002 to 2009, Jin and Zhang (2013) estimate these two parameters with both the almost-ideal-demand-system and the linear double-logarithmic model specifications. Their estimated price elasticity is close to unity and increases as income grows. This suggests that it might be effective to use pricing policies for demand-side management to adjust the electricity consumption of high-income groups. On the other hand, given that the estimated income elasticity is low, supporting policies are needed for low-income groups severely hit by increasing tariffs. In this regard, the authors suggest that either directly subsidizing low-income families or rationally setting the price levels of different tariff blocks can help improve the distributional effects of tariff reform.

In December 2013, NDRC expanded the three-tiered electrify pricing approach to the aluminum sector to phase out outdated production capacity and promote industrial restructuring more quickly. From the beginning of 2014, power tariffs remain unchanged for aluminum smelters that do not use more than 13,700 kWh per ton of electrolytic aluminum. Smelters that use more than 13,700 kWh but less than 13,800 kWh per ton will charge an additional RMB 0.02 per kWh, and those smelters that consume more than 13,800 kWh per ton will charge an additional RMB 0.08 per kWh. Moreover, smelters that consume more than 13,700 kWh per ton are not allowed to directly purchase electricity from power plants (NDRC and MIIT, 2013; Gao, 2013). Similar tiered power pricing policy is expected to implement in other industries, such as cement, to force upgrades in the drive for sustained and healthy development.

6. Energy subsidies

Even if the aforementioned price of coal for non-utility use, the so-called "market coal", has been determined by the market, it does not fully reflect the cost of production. Mao et al. (2008) estimate that if the government's controlled costs and the distorted prices in other production factors, such as land and resources, are factored in, the cost of coal would increase by 54 percent. If externalities such as conventional environmental and health impacts are added, the cost of coal would go up by 70 percent. The negative externalities do not include damage costs of global climate change as a result of CO_2 and other greenhouse gas emissions, and are therefore underestimated. Even if the conservative estimate puts the economic costs of coal exploration, transportation and use at Yuan 1745 billion in 2007, or 7.1 percent of that year's gross domestic product (GDP) (Mao et al., 2008). International Monetary Fund (IMF) factors in damage costs of global climate change. Assuming the costs of US$25 per ton of CO_2 equivalent, post-tax coal subsidies, namely the sum of pre-tax and tax subsidies, are estimated to be US$ 236 billion in 2011 in China, or 3.82 percent of that year's GDP. Compared with the amount of post-tax subsidies for petroleum products, natural gas and electricity, which amounted to 0.20 percent, 0.09 percent, and 0.30 percent of GDP in 2011 respectively, post-tax coal subsidies are substantial (Clements et al., 2013). This is mainly because coal dominates in China's energy mix, accounting for accounting for 65.7% of total energy use in 2013 and because coal prices are far below the levels needed to address negative environmental and health externalities.

A subsidy is made of producer subsidy and consumer subsidy. A producer subsidy increases the price received by producers, while a consumer subsidy lowers the price paid by consumers. Measured on a tax-inclusive basis, virtually all of the world's economies provide energy subsidies of some kind (IEA, 2006; Zhang, 2008; Clements et al., 2013). Such subsidies differ by energy type across countries. As a share of GDP, post-tax subsidies are roughly eight times larger in the Middle East and North African region than in advanced economies. In absolute terms, the US, China and Russia are the top three subsidizers across the world, providing subsidies of US$ 502 billion, US$279 billion, and US$116 billion in 2011, respectively (Clements et al., 2013). Widespread use of energy subsidies leads to inefficient production and use of energy and resources, creates no incentive for energy and resource conservation, and gives rise to significant amount of emissions that can otherwise be avoided if subsidies are removed and energy prices get right. By lowering the prices of fossil fuels, such fossil fuel subsidies also are widely considered to distort international trade (Zhang and Assunção, 2004).

Clearly, removing these subsidies is essential to provide incentives for investment

and production of cleaner energy on the supply side and efficient energy use and adoption of clean technologies on the demand side that reduce emissions at sources. This helps the economic recovery in the short term and serves as the driver of sustainable and balanced economic growth in the long run. Thus, in 2009, the Group of 20 advanced and emerging market economies called for a phase out of inefficient fossil fuel subsidies in all countries, and reaffirmed this again in 2012. Eliminating energy subsidies would generate substantial environmental benefits. IMF estimates that raising energy prices to levels would eliminate tax-inclusive subsidies for petroleum products, natural gas and coal would reduce 4.5 billion tons of CO_2 emissions, representing a 13 percent cut in global energy-related CO_2 emissions (Clements et al., 2013).

7. Putting resource taxes and reform in context

In physical terms, on average, coal production in China increased yearly by 200 million tons over the past 10 years, but increased by 50 million tons in 2013; in percentage terms, coal use increased yearly by 9 percent over the past 10 years, but increased by 2.6 percent in 2013. If strict measures would be taken, coal consumption could be estimated to peak in 2015-2020, with the resulting CO_2 emissions estimated to peak in 2025-2030, and coal's share in the total energy mix would be estimated to be below 50 percent in 2030 (Wang, 2014).

The imposition of environmental taxes or carbon taxes clearly helps to keep coal use under control. The Chinese legislature is considering the revision of existing environmental law and the promulgating of environmental tax law. However, this legislation process takes time, and until it is completed, there is no legal basis to authorize the levy of these taxes.

To avoid wasteful extraction and use of resources while alleviating the financial burden of local governments, China needs to reform its current coverage of resource taxation and to significantly increase the levied level. Since the tax-sharing system was adopted in China in 1994, taxes are grouped into taxes collected by the central government, taxes collected by local governments and taxes shared between the central and local governments. All those taxes that have steady sources and broad bases and are easily collected, such as the consumption tax, tariffs and vehicle purchase tax, are assigned to the central government. VAT and income tax are split between the central and local governments, with 75 percent of VAT and 60 percent of income tax going to the central government. This led the share of the central government in the total government revenue to go up to 55.7 percent in 1994 from 22.0 percent in the previous

year. In the meantime, the share of the central government in the total government expenditure just rose by 2 percent. By 2009, local governments only accounted for 47.6 percent of the total government revenue, but their expenditure accounted for 80.0 percent of the total government expenditure in China. To enable to pay their expenditure for culture and education, supporting agricultural production, social security subsidiary, and so on, local governments have little choice but to focus on local development and GDP. That will in turn enable them to enlarge their tax revenue by collecting urban maintenance and development tax, contract tax, arable land occupation tax, urban land use tax, and so on (Zhang, 2008, 2011).

Alleviating the financial burden of local governments is one avenue to incentivize them not to focus on economic growth alone. Enlarging their tax revenue is the key to helping them cover a disproportional portion of the aforementioned government expenditure. In the tax-sharing system adopted in 1994, onshore resource taxes are assigned to local governments, while the central government is collecting revenues from resource taxes offshore. In 1984, resource taxes have been levied at Yuan 2–5 per ton of raw coal and Yuan 8 per ton of coking coal, with the weighted average of Yuan 3.5 per ton of coal. For crude oil, the corresponding tax is levied at Yuan 8–30 per ton. While the prices of coal and oil have significantly increased since 1984, the levels of their resource taxes have remained unchanged over the past 25 years (Zhang, 2011). As a result, the resource taxes raised amounted to only Yuan 33.8 billion, accounting for about 0.57 percent of China's total tax revenues and about 17.5 percent of the national government expenditure for environmental protection that amounted to Yuan 193.4 billion in 2009 (NBS, 2010). Therefore, to avoid wasteful extraction and use of resources while alleviating the financial burden of local governments, the way of levying taxes on resources in China should be changed. Such taxation should be levied based on revenues. In addition, current resource taxes are only levied on seven types of resources including coal, oil and natural gas. This coverage is too narrow, falling far short of the purposes of both preserving resources and protecting the environment. Thus, overhauling resource taxes also includes broadening their coverage so that more resources will be subject to resource taxation.

Clearly, broadening the current coverage of resource taxation and significantly increasing the levied level also help to increase local government's revenues while conserving resources and preserving the environment. The Chinese central government started a pilot reform on resource taxation in Xinjiang, China's northwestern border area of abundant resources and numerous opportunities for growth and expansion. Since June 1, 2010, crude oil and natural gas are taxed by revenues rather than volume in Xinjiang.

While it is enacted as part of a massive support package to help Xinjiang achieve leapfrog-like development, which is considered a strategic choice to deepen the country's Western Development Strategy and tap new sources of economic growth for China, this new resource tax will help to significantly increase the revenues for Xinjiang. It is estimated that the new resource tax levied at a rate of 5 percent will generate additional annual revenues of Yuan 4–5 billion for Xinjiang (Dai, 2010). This is a significant increase, in comparison with the total resource tax revenues of Yuan 1.23 billion in 2009, inclusive of those from other resources than crude oil and natural gas (NBS, 2010). This will contribute to 17–21 percent of the total tax revenues for Xinjiang, in comparison with the contribution level of about 4.1 percent in 2009.

The resource tax levied on crude oil and natural gas by revenues rather than by existing extracted volume, which was applied nationwide since November 1, 2011, is the first step in the right direction. There have been intensified discussions on levying resource tax on coal by revenues along this line. It is most likely that China will overhaul the current practice and levy on coal by revenues in 2014. Coal-rich provinces, like Shanxi and Inner Mongolia, have studied options to levy on coal by revenues. The tax rates are proposed to be in the range of 2-10 percent, depending on the extent to which current fees and charges are cut or abolished. Specifically, assuming coal price of Yuan 465 per ton, Shanxi proposes to levy at 2.2 percent if the charge for coal sustainable development fund (which charges Yuan 8-23 per ton, depending on the type of coal) remains; 7.4 percent if that charge is abolished. If coal price is assumed at Yuan 440 per ton, then Shanxi proposes to levy at 2.4 percent if the charge for coal sustainable development fund remains; 7.6 percent if that charge is abolished (Xing, 2013; Wang et al., 2014).

8. Conclusions

The Third Plenum of the 18th Central Committee of Communist Party of China in November 2013 strongly signaled the Chinese leadership's determination to embark upon a new wave of comprehensive reforms in China. This is clearly reflected by the Plenum's key decision of assigning the market a decisive role in allocating resources. To have the market to play that role, getting the energy prices right is crucial because it sends clear signals to both producers and consumers of energy. Since 1984, China has been reforming energy prices. While the overall trend of such energy pricing reform has been moving away from the pricing completely set by the central government in the centrally

planned economy towards a more market-oriented pricing mechanism, the pace and scale of the reform differ across energy types.

Coal pricing reform has been most extensively in terms of both pace and scope. The dual pricing system was introduced in 1984 where enterprises were required to sell up to a predetermined quota at state set prices but were allowed to sell above the quota at market prices. As part of sweeping price reforms initiated in 1993, coal price has since been set differently, depending on its use. Under a two track system for coal prices, the price of coal for non-utility use has been determined by the market. But the price of coal for utility use is based on "guiding price" that has been set by the NDRC substantially below market prices. In 2004, NDRC abolished its guiding price for power coal and set price bands for negotiations between coal producers and electricity generators. NDRC widened those bands in 2005, and scrapped them altogether in 2006. NDRC proposed in May 2005 a coal-electricity price "co-movement" mechanism that would raise electricity tariffs if coal prices rose by 5 percent or more in no less than six months and allowed electricity generators to pass up to 70 percent of increased fuel costs on to grid companies. In December 2012, the State Council announced to abolish the two track system for coal prices, allowing the price of coal for utility use to be determined by the market just as the price of coal for non-utility use does. Moreover, it revises the coal-electricity price "co-movement" mechanism, allowing to adjust electricity tariffs if fluctuations in coal prices go beyond by 5 percent or more in 12 months and electricity generators to pass up to 90 percent of increased fuel costs on to grid companies instead of the existing 70 percent threshold.

Similar to coal, a dual pricing system for crude oil was introduced in 1984, and was virtually eliminated in 1993. Since 1998 domestic crude oil prices have tracked international prices, but refined oil product prices have not. To address this disconnect, the government has implemented since May 2009 the pricing mechanism whereby domestic petroleum product prices would be adjusted upward if the moving average of international crude oil prices based on the composited crude oil price rose by more than 4 percent within 22 consecutive working days. To better reflect refiners' costs and adapt to fluctuations in global crude oil prices, NDRC launched in March 2013 an automatic petroleum product pricing mechanism, shortening the current 22-working-day adjustment period to 10-working-day and removing the 4 percent threshold. The composition of the basket of crudes to which oil prices are linked will also be adjusted.

Reforms have been undergone for natural gas prices. A breakthrough in the reform area has been changing the existing cost-plus pricing to the "netback market value pricing" in Guangdong province and the Guangxi Zhuang Autonomous region. Under

this new pricing mechanism, pricing benchmarks are selected and are pegged to prices of alternative fuels that are formed through market forces to establish price linkage mechanism between natural gas and its alternative fuels. Gas prices at various stages will then be adjusted accordingly on this basis. Prior to implementing the Guangdong and Guangxi pilot reform program to the entire country, NDRC plans to lunch three-tier-tariffs for household use of natural gas across the whole country before the end of 2015. These price reforms and the pilot scheme in Guangdong and Guangxi help to establish a market-oriented natural gas pricing mechanism that fully reflects demand and supply conditions.

The government still retains control over electricity tariffs. But in order to encourage coal-fired power plants to install and operate flue gas desulfurization and denitrification facility the government offered since 2004 a price premium to electricity generated by coal-fired power plants with FGD facility installed and since November 2011 a price premium for electricity generated by power plants with flue gas denitrification facility. The level and scope of the price premium were amended since their initial implementation in order to achieve the mandated emissions reductions. China also charged differentiated power tariffs for companies classified as 'eliminated types' or 'restrained types' in eight energy-guzzling industries from October 2006 onwards. NDRC implemented since July 2012 three-tier-tariffs for household electricity use, and since January 2014 expanded the three-tiered electrify pricing approach to the aluminum sector to phase out outdated production capacity and promote industrial restructuring more quickly. Similar tiered power pricing policy is expected to implement in other industries, such as cement, to force upgrades in the drive for sustained and healthy development.

Clearly, China has taken great efforts towards reforming energy prices. However, such reforms are far from complete. While the new pricing mechanism for petroleum products is one step towards a more market-oriented pricing mechanism, it is still not a complete marketedlization. Petroleum product price fluctuates along with global crude oil prices, but decouples from the domestic market. The future reform of petroleum product pricing mechanism should take domestic factors into account, thus enabling petroleum product prices to reflect the relationship between its domestic supply and demand.

The aforementioned pilot scheme in Guangdong and Guangxi provides the right direction to establish a market-oriented natural gas pricing mechanism. China needs to take lessons learned from the two pilot scheme and examine what kinds of adjustments and improvements are needed regarding the choice of alternative fuels, the selection of the pricing reference point and the creation of netback market value pricing formula in

order to implement the Guangdong and Guangxi pilot reform program to the entire country.

While China has been reforming electricity industry structure since 2002, transmission, distribution and sale of electricity are operated in integration by two main grid companies, State Grid and China Southern Power Grid, and several local grid companies, such as Inner Mongolia Grid, Shaanxi Grid. As the designated sole buyers of electricity from generators and distributors and sellers of electricity, they monopolize in their respective areas. Their monopoly power and thereby the lack of competition in the electricity market has been heavily criticized. However, in my view, separation of transmission and distribution is not a must option. The feasible approach should start reforming electricity sale side by setting up the electricity power trading market. In this regard, direct purchase for major electricity users, as piloted in Yunnan province, should be actively promoted. That will help to infer the cost of electricity transmission and distribution and help the government to set the appropriate level of the grid's transmission and distribution charges in future electricity power structure reform. While splitting grid is not a must option to achieve this goal, separating electricity sale from grid's transmission and distribution is a must to establish competitive electricity power market. Then the electricity sale side can be opened and electricity selling companies independent of grids can be set up in each region. As such, marketing trade will be performed on both electricity generation side and sale side and an open nationwide electricity power market will be established to create a market-based system for electricity pricing. These are considered as the more realistic option to move electricity power reforms forward. In the meantime, given that meeting the goal of cutting NOx emissions has been lagged far behind the government's set schedule as a result of high costs involved and thereby coal-fired power plants' reluctance to install and operate denitrification facility, the government could consider raising the current level of price premium for denitrification in order to encourage such plants to install and run denitrification facility continuously and reliably.

For coal prices, even if the two track system for coal prices has been abolished, it is still very difficulty to establish nationwide coal market because railway freight capacity has not been liberalized. Given uneven geographical distribution of coal production and economic output, coal has to be transported over the long distance to the load centers, with over 40 percent of the total freight shifted by railways having been coal since 1980s (Zhang, 1998; Tu, 2013). This means that if the train wagons are not included for liberalizing, coal purchased cannot reach the load centers. Thus, future reform has to take

from a perspective of a whole coal value chain, undertaking market reform wherever the centrally planned exist on any parts of the whole value chain.

Even if such reform is undertaken, however, coal prices do not fully reflect the cost of production because of the government's controlled costs and the distorted prices in other production factors. They also do not include negative externalities. Clearly, the imposition of environmental taxes or carbon taxes can internalize externality costs into the market prices. However, given the ongoing lengthy legislation process to authorize the levy of these taxes on the one hand, and the pressing need to avoid wasteful extraction and use of resources on the other hand, China needs to reform its current narrow coverage of resource taxation and to significantly increase the levied level. The resource tax levied on crude oil and natural gas by revenues rather than by existing extracted volume is the first step in the right direction. China should broaden that reform to coal, overhauling the current practice and levy on coal by revenues. This will also help to increase local government's revenues and alleviate their financial burden of local governments to incentivize them not to focus on economic growth alone.

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Monday, May 26, 2014, 08:58

Price strategies that will matter

By Zhongxiang Zhang

Though China has signaled its intention to let the market play a decisive role in allocation of resources, it would need to make considerable progress on energy pricing to achieve tangible results in the long term.

Decisive steps on energy pricing will also help reiterate the government's strong commitment to reforms, and indicate the way forward for energy producers and consumers.

Since 1984, China has dabbled with energy reforms in one form or another. While the focus of these reforms has been to move away from a centrally monitored pricing mechanism to a more market-driven approach, the pace and scale of reforms have differed for various types of energy.

Among these reforms, the coal-pricing mechanism that has drawn much attention, especially in terms of pace and scope. The first major reform in this sector was the dual pricing system, which was introduced in 1984. Enterprises were required to sell a quota of coal at prices that were set by the central government and the rest at prevailing market rates. In 1993, the central government decided to adopt a pricing mechanism based on usage patterns.

Under the dual-pricing system, coal prices for non-utility use - the so-called market coal - were determined by the market. But the price of coal for utilities - the so-called power coal - was based on the guidance price set by the National Development and Reform Commission, often at rates lower than prevailing market rates.

In 2004, the commission decided to use price bands for fixing coal prices. Though the mechanism involved extensive discussions with coal producers and electricity generators, it was scrapped in 2006.

The commission also proposed, in May 2005, that it would consider a coal-electricity price "co-movement" mechanism that would allow power tariffs to be raised if coal prices rose by 5 percent or more over a six-month period. The scheme also allowed power generators to pass up to 70 percent of the increased fuel costs to grid companies.

However, in December 2012, the State Council announced the abolition of the dual pricing system for coal, and shifting to market-based pricing.

At the same time, it tweaked the coal-electricity price co-movement mechanism and allowed adjustment in power tariffs if coal prices fluctuated by 5 percent or more in a 12 month-period and permitted electricity generators to pass up to 90 percent of increased fuel costs to grid companies, instead of the existing 70 percent threshold.

Like coal, a dual pricing system for crude oil was introduced in 1984, and was virtually eliminated in 1993. Since 1998, domestic crude oil prices have tracked international prices, but refined oil product prices have not.

To address this disconnect, the government has, since May 2009, implemented a pricing mechanism by which it can adjust domestic petroleum product prices if the moving average of a basket of international crude oil prices, on a composite basis, rise by more than 4 percent within 22 consecutive working days.

To better reflect refiners' costs and adapt to fluctuations in global crude oil prices, in March last year the commission launched an automatic petroleum product pricing mechanism, shortening the 22-working-day adjustment period to 10-working-days and removing the 4 percent threshold. The government also decided to adjust the composition of the basket of crude to which oil prices are linked.

Reforms have also been undertaken for natural gas prices. A breakthrough in the reform area has

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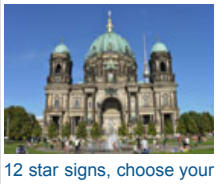
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been changing the existing cost-plus pricing to the "netback market value pricing" in Guangdong province and the Guangxi Zhuang autonomous region.

Under the new pricing mechanism, pricing benchmarks are selected and pegged to prices of alternative fuels to establish a price linkage between natural gas and its alternative fuels. Gas prices at various stages will then be adjusted accordingly.

Before introducing the Guangdong and Guangxi pilot reform program to the entire country, the commission plans to implement three-tier-tariffs for household use of natural gas across China by the end of next year. These price reforms and the pilot scheme in Guangdong and Guangxi help to establish a market-oriented natural gas pricing mechanism that fully reflects demand and supply conditions.

The government still retains control over electricity tariffs. But to encourage coal-fired power plants to install and operate flue gas desulphurization and denitrification facilities the government has since 2004 accorded a price premium for electricity generated by coal-fired power plants with flue gas desulphurization facilities installed and since November 2011 a price premium for electricity generated by power plants with flue gas denitrification facilities.

The level and scope of the price premium have been amended since their initial implementation in order to achieve the mandated emission reductions.

The government has also charged differentiated power tariffs for companies classified as "eliminated types" or "restrained types" in eight energy-guzzling industries from October 2006 onwards.

Since July 2012, the commission has used three-tier-tariffs for household electricity use, and in January this year expanded the three-tiered electrify pricing approach to the aluminum sector to phase out outdated production capacity and promote industrial restructuring more quickly.

Similar tiered power pricing policies are likely to be implemented in industries like cement to force industrial upgrades and promote sustained, healthy development.

Clearly, China has made great efforts to reform energy prices. However, such reforms are far from complete. While the new pricing mechanism for petroleum products is one step towards a more market-oriented pricing mechanism, it is still not enough.

Petroleum product prices fluctuate with global crude oil prices, and are hence decoupled from the domestic market. Reforms should also take domestic factors into account, so that petroleum product prices can better reflect the relationship between domestic supply and demand.

The pilot scheme in Guangdong and Guangxi provides the right direction to establish a market-oriented natural gas pricing mechanism.

China also needs to draw on the lessons learned from the two pilot schemes and examine what kinds of adjustments and improvements are needed regarding the choice of alternative fuels, the selection of the pricing reference point and the creation of netback market value pricing formula in order to implement the reforms on a nationwide basis.

While China has been reforming the electricity industry structure since 2002, transmission, distribution and sale of electricity is undertaken by two main grid companies, State Grid and China Southern Power Grid, and several local grid companies, such as Inner Mongolia Grid and Shaanxi Grid. As the designated sole buyers of electricity from generators and distributors and sellers of electricity, they hold monopolies in their respective areas. Their monopoly power and the lack of competition in the electricity market has often drawn criticism.

However, separation of transmission and distribution is not a viable option. The feasible approach should be to set up a power trading market. In this regard, direct purchase of power for major electricity users, as per the pilot program in Yunnan province, should be promoted. That will help to infer the actual cost of electricity transmission and its effective distribution and help the government to set the appropriate level of the grid's transmission and distribution charges in future electricity power structure reform.

While splitting the grid is not a necessary option, separating electricity sales from the grid's transmission and distribution is a must to establish a competitive power market. It would also lead to the creation of an electricity market that is not reliant on the grid. These are the more realistic options for pushing forward power reforms.

The government could also consider raising the current level of price premium for de-nitrification in order to encourage more power plants to install and run denitrification facilities.

In the case of coal, though the dual-pricing system has been abolished, it is still difficult to establish

a nationwide market, as railway freight mechanisms have not been liberalized. Given the uneven geographical distribution of coal production and output, and the need for coal to be transported over long distances, it is imperative that the freight mechanisms are also liberalized quickly. Reforms need to be targeted in such a manner that they can lead to the formation of a complete coal value chain.

However, even if such reform is undertaken coal prices do not fully reflect the cost of production because of the government's controlled costs and distorted prices. They also do not include negative externalities.

The resource tax levied on crude oil and natural gas on a revenue basis, rather than by existing extracted volume, which has been applied nationwide since November 1, 2011, is a step in the right direction.

China should broaden that reform to coal, by overhauling the current practice and fix the levy on coal by revenues. This will also help to increase local governments' revenues and alleviate their financial burden and encourage them not to focus on economic growth alone.

The author is a distinguished professor and chairman at the School of Economics, Fudan University, Shanghai. He is a fellow of the Asia and the Pacific Policy Society. The views do not necessarily reflect those of China Daily.


In letter and spirit


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Shanghai Metals Market

CHINA SILICON METAL MARKET MONTHLY

Aug. 16, 2012 | No.1 | Published by SMM | http:// en.smm.cn | 11 Pages

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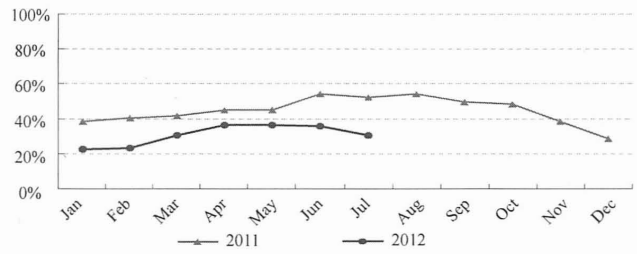
Operating Rate

Based on result of an SMM survey on operating rates at China's major silicon metal producers, operating rates at China's major silicon metal producers were 30.47% in July, down 5.48% from a month earlier.

Operating Rate at China Silicon Metal Producer 2011-2012



Source: SMM

Guide

Market Focus: Electricity prices at silicon metal producers in Fujian, Yunnan and Sichuan were lowered down during high-water period.

Operating Rate: Operating rates at China silicon metal producers fell to 30.47% in July.

Aluminum Alloy: Orders at cast aluminum alloy enterprises slipped during July, causing producers to cut production.

Silicon Metal Powder: Nearly 90% of silicon metal powder producers have halted production and most of them were pessimistic to market outlook.

Polysilicon: The Ministry of Commerce decided to conduct anti-dumping investigation to imported solar-grade polysilicon from South Korea and the US since July 20, 2012.

Trichlorosilane: 80% of trichlorosilane enterprises stopped operations by as of the end of July, while 70% of them have halted production for over 10 months and more than 10% suspended for at least 8 months

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Market Focus

Fujian Province Cuts Electricity Price in July

Number of producers still keeping production was limited in Fujian province in July. Since supply of hydro-electricity was ample during the high-water period, local government in Fujian province cut local-grid electricity prices in July in order to stimulate producers' willingness to keep production and to increase fiscal revenue. Electricity prices from state grid did not change in July, while electricity price from local grid were cut down.

According to SMM sources, electricity prices at Sanming city, a major silicon metal producing city in Fujian province, were cut by RMB 0.04-0.1/kwh from previous RMB 0.46-0.48/kwh, while prices at Zhangzhou city, a major silicon metal producing city in Fujian province, were cut by RMB 0.04-0.06/kwh from previous RMB 0.46-0.48/kwh. The new electricity price contract will take effect from July to September.

As of July 26th, 90% silicon metal producers enjoyed high-water period electricity prices.

Table 1: Electricity Price Cut at Silicon Metal Producers in Fujian Province Unit: RMB/kwh

Region	June	July
Sanming city	0.46-0.48	0.36-0.44
Zhangzhou city	0.46-0.48	0.40-0.44

Yunnan Province Cuts Electricity Price in July

Local government in Yunnan province cut electricity prices at local silicon metal producers for three times this year. According to SMM sources, the electricity price adjustments on silicon metal producers in Yunnan province are as follows.

Table 2: Electricity Price Cut at Silicon Metal Producers in Yunnan Province Unit: RMB/kwh

Region	Late May	Early July	Late July
Baoshan city	0.346	0.326	0.268
Nujiang prefecture	0.26	0.26	0.26
Dehong prefecture	0.325	0.325	0.28
Wenshan prefecture	0.26	0.26	0.26

Contract for the latest electricity prices shall take effect from August 1st to October 25th.

Industrial enterprises, including silicon metal producers, are challenged by many difficulties, such as falling prices, rising production costs, low operating rates etc. The price cut is kind of supportive measure adopted by local government to ensure stable growth of local economy amid current economic slowdown.

Sichuan Province Cuts Electricity Price in July

Following electricity price cut in July, local government in Sichuan cut electricity prices at silicon metal producers in Liangshan prefecture in late July again.

According to SMM sources, electricity prices were unchanged, while electricity prices were cut by RMB 0.05/kwh to RMB 0.26-0.29/kwh, effective from August. The electricity price adjustments on silicon metal producers in Liangshan prefecture in Sichuan province are as follows.

Table 3: Electricity Price Cut at Silicon Metal Producers in Sichuan Province Unit: RMB/kwh

Region	Late May	Late July
Liangshan prefecture (local-grid)	RMB 0.34/kwh	RMB 0.29/kwh
Liangshan prefecture (state-grid)	RMB 0.355/kwh	RMB 0.355/kwh

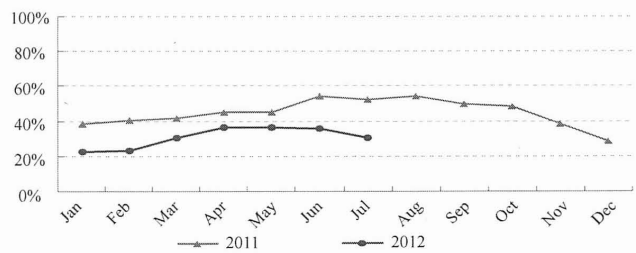
Operating Rate

Based on result of an SMM survey, operating rates at China's silicon metal producers were 30.47% in July, down 5.48% from a month earlier.

Since silicon metal prices already fell below production costs, silicon metal producers chose to cut production or halt production in order to reduce survival pressure, which was the major reason behind July's operating rate decline. With regard to geographical distribution of China's silicon metal producers, most of them were located in southern China, and number of producers in Northern China was limited, with most producers in Northern China found in Xinjiang.

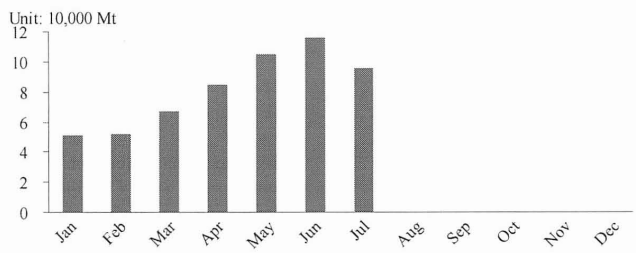
SMM survey covered 155 silicon metal producers, with annual capacity around 3.40 million mt/yr, accounting for over 85% of China's total capacity.

Figure 1: Operating Rate at China Silicon Metal Producer 2011-2-12



Source: SMM

Figure 2: China Silicon Metal Monthly Output 2012



Source: SMM

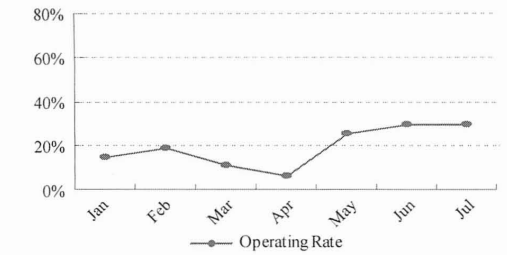
Table 4: Operating Rate at China Silicon Metal Producer in July 2012

Capacity Scale (Unit: 10,000 Mt/yr)	Number of Surveyed Compan	July Output (Unit: 10,000 Mt)	2012 Capacity (Unit: 10,000 Mt)	July Operating Rate
X≥4	20	3.10	148.51	24.91%
4>X≥1	77	4.34	150.80	34.56%
X<1	58	1.20	40.34	35.68%
Total	**155**	**8.63**	**339.65**	**30.47%**

Source: SMM
Note: "X" refers to company capacity scale

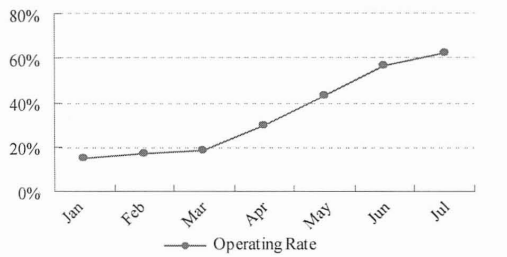
Based on the survey result, operating rate at China's silicon metal producers slipped significantly in July, which was mainly due to production suspension or production reduction amid continuous price decline, rising production costs and sluggish downstream demand. As reflected from the table, operating rate was stable at medium-sized silicon metal producers, with operating rate only slipping slightly in July on a monthly basis.

Figure 3: July Operating Rate at Yunnan Silicon Metal Producer



Source: IME

Figure 4: July Operating Rate at Sichuan Silicon Metal Producer



Source: SMM

Figure 5: July Operating Rate at Fujian Silicon Metal Producer

Source: IME

Figure 6: July Operating Rate at Xinjiang Silicon Metal Producer

Source: SMM

Domestic Market

In early July, China's silicon metal prices fell remarkably, with price decline most striking at Huangpu port and Kunming city. According to SMM sources, inventories were high at producers' warehouses and major ports' warehouses, which took up a large amount of working capital. Some producers with cash flow pressure were forced to cut prices to promote sales. Supply of silicon metal increased, while downstream demand still did not improve, further weighing down silicon metal prices. According to SMM sources, some silicon metal producers in Yunnan and Sichuan provinces halted production immediately in response to price decline, as they were unable to stand for current losses.

In middle July, production suspension scale expanded throughout China, but still failing to prevent silicon metal prices from slipping. Average prices of metallurgical-grade silicon metal at Huangpu port was down RMB 500/mt during the first two week of July. Producers, with the exception of produces with tight cash-flow pressure, preferred to pile up inventories, as they shall incur heavier losses if they move goods at current prices.

In late July, silicon metal prices stagnated. Affected by poor market performance, operating rates at silicon metal producers in Sichuan, Yunnan and Xinjiang where electricity prices

are lower than other regions, begun to slip. The operating rates at producers in Hunan and Guizhou were even lower. Development in Fujian province was very similar to other major producing regions, with producers also beginning production cut. The production cut, coupled with Yunnan silicon metal producers' unwillingness to move goods, left supply of #553 and #441 spot silicon metal tight, which made offers of silicon metal increase by RMB 100-200/mt in Xinjiang and Yunnan. According to SMM sources, the low market price made producers incur losses, so most of them were reluctant to move goods. SMM believes that the price rebound in late July is reasonable, since demand for silicon metal did not improve much both at home and abroad in July and as previous silicon metal prices were lower than production costs.

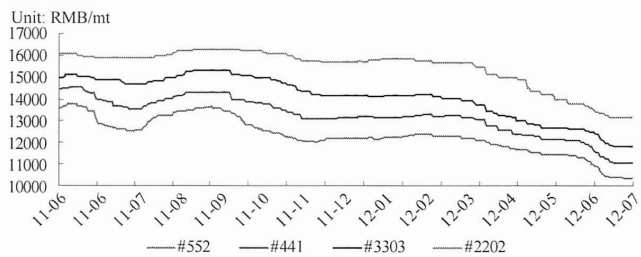
Table 5: Comparison of Average Monthly Price of Metallurgical-Grade Silicon Metal at Huangpu Port in July 2012

Unit: RMB/mt

Specification	2011 July	2012 June	2012 July	YoY	MoM
#553	12671.43	11382.50	10545.45	-16.78%	-7.35%
#441	13709.52	12090.00	11254.55	-17.91%	-6.91%
#3303	14802.38	12665.00	12013.64	-18.84%	-5.14%
#2202	15900.00	13910.00	13265.91	-16.57%	-4.63%

Source: SMM

Figure 7: Price Trends of Metallurgical-Grade Silicon Metal at Huangpu Port



Source: SMM

Table 6: Comparison of Average Monthly Price of China Chemical-Grade Silicon Metal in July 2012

Unit: RMB/mt

Specification	2011 July	2012 June	2012 July	YoY	MoM
#421	14804.76	12680.00	12081.82	-18.39%	-4.72%
#411	14966.67	12795.00	12120.45	-19.02%	-5.27%

Source: SMM

Note: the above prices are RMB-denominated prices of chemical-grade silicon metal shipped from factories to major ports in China, such as Huangpu port in Eastern China and Dalian and Tianjin ports in Northern China.

Export Market

Silicon metal export market was even quieter in July against the background of sluggish global economy and weak silicon industrial chain. Coupled with the summer break at downstream producers in overseas market, the export market turned even bitterer. In order to seize market, domestic lowered quotas. Traded prices of #553 silicon metal Huangpu port fell below USD 2,000/mt in July.

Actual traded prices of silicon metal were already far lower than prices restricted by Huangpu port.

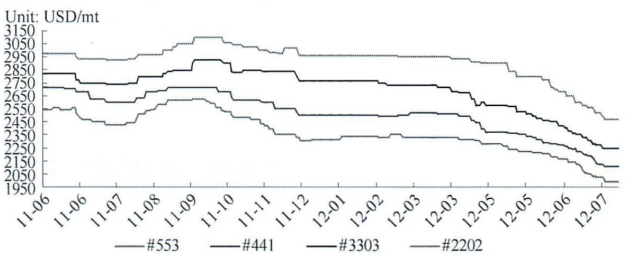
The lowest export prices of silicon metal for #553 silicon metal is restricted at USD 2,220/mt by Huangpu port, USD 2,330/mt for #441 silicon metal, USD 2,450/mt for #3303 silicon metal, and USD 2,690/mt for #2202 silicon metal.

Table 7: Comparison of Average Monthly FOB of Silicon Metal at Huangpu Port Unit: USD/mt

Specification	2011 July	2012 June	2012 July	YoY	MoM
#553	2443.33	2184.75	2034.33	-16.74%	-6.88%
#441	2619.52	2284.75	2148.83	-17.97%	-5.95%
#3303	2743.57	2442	2283.66	-16.76%	-6.48%
#2202	2935.71	2728.5	2517	-14.26%	-7.75%

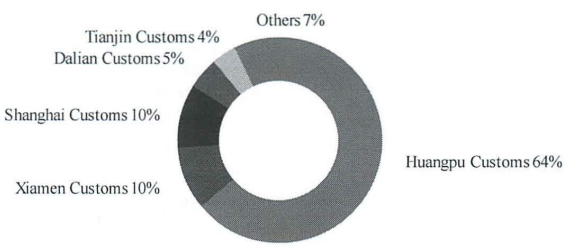
Source: SMM

Figure 8: FOB Price Trends of Silicon Metal at Huangpu Port



Source: SMM

Figure 9: China Silicon Metal Export by Customs in June



Source:: China Customs

Table 8: China Top 10 Silicon Metal Exporters in June

Rank	Company	Volume (Kg)	Value (USD)
1	Xiamen International Trade Group	3989000	10148072
2	Nenjiang Shuangfei Economy and Trade Company Co., Ltd.	2471000	5200821
3	Fuyuan Antong Economic and Trade Company Co., Ltd.	2084000	4805202
4	Wacker-Chemie Trade (Shanghai) Company Co., Ltd.	2000000	5846292
5	China Zhejiang Kaihua Yuantong Silicon Industry Co., Ltd.	1800000	5951181
6	Shanghai Puyuan Foreign Economic and Trade Company Co., Ltd.	1500000	3382370
7	2305969064	1276000	2906240
8	Xinjiang Western Hesheng Silicon Industry Co., Ltd.	1160000	3154058
9	Sunwu Huaxin Economic and Trade Co., Ltd.	1118000	2501071
10	Guangzhou Baochang Yuntong Logistic Co., Ltd.	1115000	3165960

Source: China Customs

Price Forecast

Supply: operating rate at China's silicon metal producers fell to 30.47%, while output of silicon metal was around 96,000 mt in July, which were both lower than previous years. The low operating rates left electricity supply in surplus. In response, local government in Yunnan, Sichuan and Fujian provinces lowered electricity prices to stimulate producers' willingness to resume production, however, the actual effects of electricity price cut were limited, with operating rates remaining unchanged. SMM expects that operating rates at China's silicon metal producers will remain between 30-35% in August, and supply of silicon metal will not increase significantly.

Demand: some domestic traders with strong competitive strength began to replenish stocks in July. An enterprise in South Korea entrusted a domestic trader to purchase low-grade silicon metal in a large amount. Purchases were largely for oxygen #553 and #441 silicon metal from aluminum alloy sector. SMM expects market still has purchasing demand in August, but overall purchases will be not in large amounts.

Silicon metal prices are poised to rise after hitting lows in July. In early August, silicon metal prices only rebounded slightly since downstream demand still did not improve. Considering electricity price cut at major producing regions, SMM expects that prices of low-grade silicon metal will fluctuate, while prices of high-grade silicon metal will remain stable.

Downstream Market

Aluminum Alloy

Orders at cast aluminum alloy enterprises slipped during July, causing producers to cut production with their operating rates down more than 5% in general. Meanwhile, some enterprises, in order to reach sales goals, cut prices sharply, which severely impact other enterprises. Most goods supplied by enterprises in Hunan and Shandong flowed into markets in Jiangsu and Zhejiang during July, despite the price advantage, consumption remained soft. This should be attributed to the weak demand for cast aluminum alloy in summer – the traditional low demand season for the product. During summer, demand for cast aluminum alloy used for automobiles and home appliances dropped significantly, and the continuous weak trends of aluminum prices also discouraged buying interest, leaving transactions quiet.

Some smaller cast aluminum alloy enterprises in East China cut production massively due to the sharp decline in downstream orders, curtailing goods available to the market. Some enterprises of financial strength still sold goods at lower prices to seek to acquire customers, with prices to the factory settled in cash between RMB 16,000-16,200/mt, largely hurting other enterprises. The unexpected production cut at a large aluminum alloy ingot producers in East China exacerbated the situation. With respect to downstream demand, the purchases in East China market remained sluggish with downstream buyers only buying goods as needed and unwilling to build additional inventories.

By July's end, prices for ADC12 aluminum alloy ingots in Zhejiang were between RMB 15,800-16,100/mt. Most downstream enterprises in Yongkang and Cixi still failed to pay on time, placing heavy pressures on local cast aluminum alloy producers. Prices for goods from Anhui and Jaingxi were mainly below RMB 16,000/mt.

Table 9: Comparison of Average Monthly Price of ADC12 Aluminum Alloy Unit: RMB/mt

Specification	2011 July	2012 June	2012 July	YoY	MoM
ADC12 (Primary aluminum)	19402.38	17427.50	17154.84	-11.58%	-1.56%
ADC12 (Scrap aluminum)	18205.95	16832.50	16520.97	-9.26%	-1.85%

Source: SMM

Silicon Metal Powder

During July, silicon metal powder sector was still constrained by the sluggish downstream demand, with prices unable to gain any support and trading remaining thin.

Prices of silicone monomer kept falling in July. Dow Corning and Wynca Chemical, tow leading enterprises in the sector, cut prices twice during the month, while most of other plants had to cut production. Over 80% of polysilicon and trichlorosilane producers suspended production, while some other producers were able to use silicon metal powder produced by themselves for production. Thus, silicon metal powder prices slumped, leaving sales rather poor.

According to statistics, as of July 31, nearly 90% of silicon metal powder producers have halted production and most of them were pessimistic to market outlook.

Table 10: Comparison of Average Monthly Price of Silicon Metal Powder 40-120 Mesh

Unit: RMB/mt

Specification	2011 July	2012 June	2012 July	YoY	MoM
#553	--	13072	12250	--	-6.29%
#441	16750	13572	12950	-4.58%	-4.58%
#421	16950	14155	13700	-3.21%	-3.21%
#411	17400	14236	13750	-3.41%	-3.41%

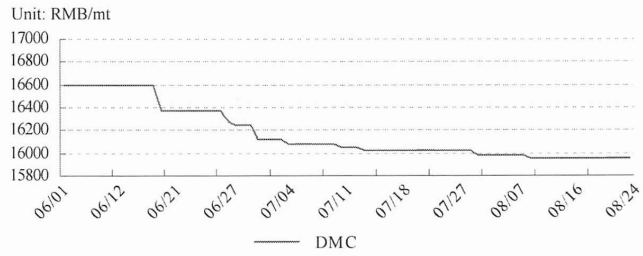
Source: SMM

Organic Silicon

Domestic organic silicon prices rose slightly in August, which was due to slightly tight supply amid low operating rates at producers. Overseas demand for organic silicon was weak by virtue of the European debt crisis and lackluster US economy. Domestic demand was negatively affected by economic slowdown.

Offers of DMC slightly advanced. Mainstream traded prices of DMC were between RMB 15,800-16,200/mt. Market expects risk transactions in September and October which are traditional high-demand months, so some purchasers plan to replenish stocks in large amount. Some market insiders also believe that any room for organic silicon prices to fall further will be limited since organic silicon prices have hovered at low levels for a long time. Therefore, organic silicon prices have momentum to rebound in the short term, but performance in the long term shall depend on fundamentals and economic policies from home and abroad.

Figure 10: Domestic DMC Price Trend Jun.-Aug.2012



Source: SMM

Polysilicon

The Ministry of Commerce decided to conduct anti-dumping investigation to imported solar-grade polysilicon from South Korea and the US since July 20, 2012. The investigation will be completed before July 20, 2013, or, in exceptional cases, to be extended to January 20, 2014.

China's investigation to polysilicon from the US may be a fightback against US investigation for China's battery, with an attempt to make US to reduce or lift the tax on batteries. SMM believes polysilicon prices should fluctuate widely influenced by the news but remain at a low level since actual demand is still weak.

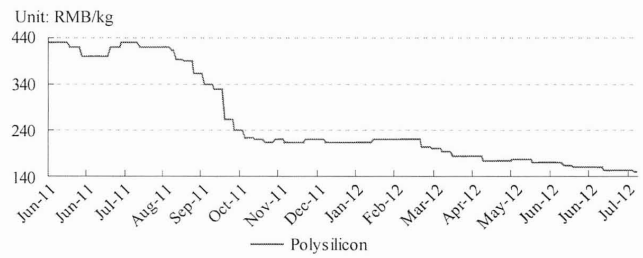
SolarWorld, a German company, submitted application to the EU for launching anti-dumping investigations to China's PV enterprises by the end of July, only two months after the announcement of a preliminary result of the investigation to China's PV enterprises conducted by US Department of Commerce. The investigation by the EU will last longer, and the decision expected to be made 15 months later is unpredictable.

Table 11: Comparison of Average Monthly Price of Polysilicon Unit: RMB/kg

Specification	2011 July	2012 June	2012 July	YoY	MoM
Polysilicon	415.71	164.05	155.68	-62.55%	-5.10%

Source: SMM

Figure 11: Price Trends of Polysilicon 2011-2012



Source: SMM

Trichlorosilane

Trichlorosilane market remained dismal in July with downstream demand still depressed. According to SMM's survey, 80% of trichlorosilane enterprises stopped operations by as of the end of July, while 70% of them have halted production for over 10 months and more than 10% suspended for at least 8 months. Only several financially strong enterprises maintained production.

Since many trichlorosilane enterprises suspended production, and most enterprises produced trichlorosilane for their own production, leaving only a few of them sell products to downstream polysilicon and silicone enterprises. At present, the costs of China's trichlorosilane enterprises were at around RMB 6,500/mt or even above RMB 7,000/mt, fat beyond the mainstream ex-work prices of RMB 4,200-4,600/mt in domestic market. As such, most enterprises suffered losses in July despite the relatively stable prices.

At the end of July, many enterprises were mired in the frequent trade disputes for downstream polysilicon and PV products and were on the verge of bankruptcy. A large number of staff faced risk of layoffs consequently. Under these situations, trichlorosilane demand should remain unpromising.

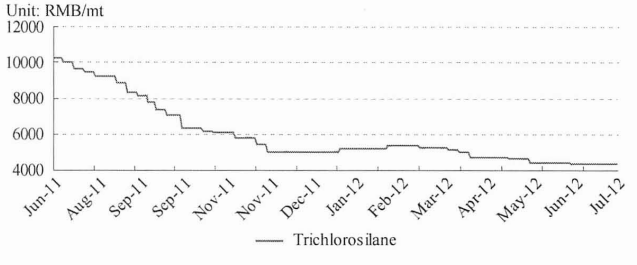
Table 12: Comparison of Average Monthly Price of Trichlorosilane

Unit: RMB/mt

Specification	2011 July	2012 June	2012 July	YoY	MoM
Trichlorosilane	9781.25	4412.50	4350.00	-55.53%	-1.42%

Source: SMM

Figure 12: Price Trends of Trichlorosilane 2011-2012



Source: SMM

Related News

Economic News

Base Metals Rebound on Liquidity Easing

According to China Federation of Logistics and Purchasing, China's official PMI for June fell to 50.2 from 50.4 in May, the lowest since last November, suggesting the world's second largest economy has yet to hit bottom and more easing policies are needed.

Base Metals Move Weakly as Economy Declines

Data from the National Bureau of Statistics July 13 showed that China's GDP growth for 2Q 2012 was 7.6%, down for six straight quarters since December 2010, hitting a three-year low. China's GDP in 1H 2012, calculated at comparable prices, rose 7.8% year-on-year.

More Pro-growth Measures Expected

The obvious slowdown of Chinese economy in the first half of this year, along with a decline of economic growth rate for six consecutive quarters, especially thelower-than-8% growth in 2Q, has set tone for fiscal and monetary policies for the second half. It is expected that more pro-growth measures will be rolled out at the midterm meeting on China's economic situations hosted by the State Council.

Metals to Continue Fall on Manufacturing Contraction

The preliminary reading of China's HSBC manufacturing PMI for July was 49.5, up from 48.2 in June, the highest in five months. Manufacturing output was 51.2, a nine-month high.

Metals News

NMA to Set Up Aluminum Alloy Plant in India

Japan's Nikkei MC Aluminium (NMA) recently announced it will form a joint venture with Indian Century Metal Recycling (CMR) for setting up an aluminum alloy plant at Haryana in India. "The plant, costing INR 500 million, will manufacture aluminum alloy used in auto sector", said NMA Chairman Shuzou Hammamura.

25 EU Countries Try to Avoid Bankruptcy by Curbing Chinese Photovoltaic Industry

Four photovoltaic giants Yingli Solar, Suntech, Trina Solar, and Canadian Solar issued a joint statement strongly appealing the EU to think over about launching anti-dumping investigations into Chinese photovoltaic enterprises. 25 photovoltaic producers from EU member countries including Germany, Italy and Spain appealed to the EU to impose punitive tariffs on Chinese photovoltaic products in a bid to avoid bankruptcy throughout the European photovoltaic industry.

China Guodian and Huadian to Invest Over RMB 700 Bln in Xinjiang Targeting Energy Projects

It is reported China Guodian Corporation and China Huadian Corporation plan to invest over RMB 700 billion in Xinjiang during the 12th Five-year Plan period. Guodian plans to invest RMB 100 billion in the 4 billion m^3 phase I project of a 10 billion m3 coal gas project, with 10 million KW in scale and a capacity to produce over 30 million mt of coal every year. Besides, China Huadian Corporation plans to invest RMB 46.2 billion in a 4 billion m^3 coal gas project with scale over 10 million KW and coal capacity exceeding 15 million mt/yr by 2015.

Sun Power Signs with Shengda Wooden Industry on 3MW Photovoltaic Power Generation Demonstration Project

Hainan Shengda Wooden Industry Group's 3MW photovoltaic power generation demonstration project belongs to not only 15MW Centralized photovoltaic power generation demonstration project in Haikou national high and new tech industrial development zone and Haikou comprehensive bonded area, but also 10MW distributed customer side photovoltaic power generation demonstration project. The project has been approved by the Ministry of Finance, Ministry of Science and Technology and Energy Administration of China in 2011. The project has an investment of RMB 42 million and installed capacity of 3000KW.

Geto Invests RMB 300 Mln in Aluminum Alloy Project in Jiangxi

Jiangxi Geto Modern Construction Tech Company, an aluminum alloy building material producer, has been founded in Industrial Park in Guangchang County. With a total investment of RMB 300 million and an area occupying 10 hectare for Phase one, the project specializes in the production of aluminum alloy template, scaffolding and frames. Upon completion, the project will achieve an annual aluminum alloy template capacity of 400,000 m2, with output value and tax payable expected at RMB 600 million and RMB 15 million, respectively.

Xinghuo Star Invests in Silicone Regeneration Project

Jiangxi Xinghuo Star invested RMB 210 million in silicone regeneration project capable of processing 10,000 mt silicone slurry residue every year and producing 2,000 mt copper sulfate, 2,000 mt special silicone oil and 500 mt silicone catalyst when fully online.

SMM also provides

	Product	Frequency
Metal	China Base Metal Briefing	Weekly
	China Aluminum Weekly	Weekly
	China Aluminum Alloy Weekly	Weekly
	China Lead Weekly	Weekly
	China Zinc Weekly	Weekly
	China Scrap Copper Weekly	Weekly
	China Copper Monthly	Monthly
	China Aluminum Monthly	Monthly
	China Nickel Monthly	Monthly
	China Silicon Monthly	Monthly
	China Rare Earth Quarterly	Quarterly
	China Copper Industry Chain Analysis, 2011-2012	Annual
	China Aluminum Industry Chain Analysis, 2011-2012	Annual
	China Lead Industry Chain Analysis, 2011-2012	Annual
	China Zinc Industry Chain Analysis, 2011-2012	Annual
	China Nickel Industry Chain Analysis, 2011-2012	Annual
	China EMM Industry Chain Analysis, 2011-2012	Annual
	China Silicon Metal Industry Chain Analysis, 2011-2012	Annual

	Product	Frequency
Steel	China Steel Briefing	Weekly
	China Iron Ore Weekly Monitor	Weekly
	China Coke & Coking Coal	Weekly
	China Iron Ore Monthly Monitor	Monthly
	China Steel PMI	Monthly
	China Steel Industry Capacity Forecast, 2011-2015	Annual
	China Steel Industry Demand Forecast, 2011-2015	Annual
	China Steel Industry Cost Analysis, 2011	Annual

Research Reports	China Manganese Ore Analysis, 2011
	China Copper Smelting Industry Report, 2011
	China Zinc Smelting Industry Report, 2011
	China Lead Smelting Industry Report, 2011
	China Polysilicon Industry Report 2011
	China Scrap Aluminum Industry Report 2011
	China Scrap Copper Downstream Demand Report 2011
	China Aluminum Semis Industry Report 2011
	China Secondary Lead Market Report 2011
	Copper in Power Cables - Outlook to 2020
	China Bauxite Industry Report
	China Nickel Ore Industry Report
	China NPI Producers Survey Report
	China Lead and Zinc Ore Industry Analysis Report
	China Copper Concentrate Industry Analysis Report
	China Zinc Cost Analysis Report

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Exchange Rates in RMB Nov 19 2012

100 units of foreign currencies

USD	629.26	HKD	81.174
EUR	804.23	JPY	7.7140
GBP	1000.27	AUD	654.97

Yunnan releases new electricity price

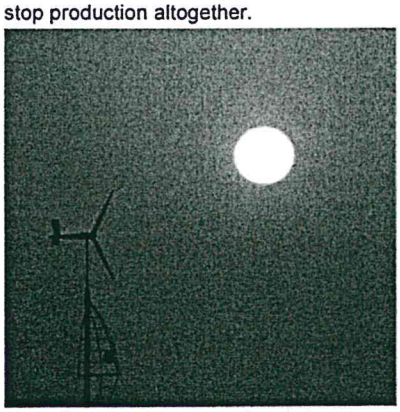
2012-06-26 13:29:07

Recently affected by the decreasing electricity price during high water period, the buyers obviously took a wait and see attitude, the silicon market stayed weak and the silicon price also declined. The quotation range in different districts was gradually expanded. In late May, even few quotation of silicon metal 553# was 11,100yuan/t and in the meanwhile few quotation of silicon metal 441# was less than 12,000yuan/t in Yunnan.

Yunnan government released the electricity price by the end of May. The electricity price (including tax) in different areas is as follow: RMB0.34/KWh in Dehong, RMB0.34/KWh in Baoshan and RMB0.26/KWh in Liuku. The electricity price decreased by RMB0.1/KWh compared with the last standard after the adjustment. As far as we know, 1t silicon metal need to consume 12,000-13,000KWh electricity, thus the average production cost decreased by 1,000-1,300yuan/t, which will promote the competitiveness of local silicon metal plants in Yunnan.

However some silicon metal producers indicated that although the production cost decreased sharply during high water period, they must consider the increasing operating rate in future market and the weak condition in the downstream market, they estimated silicon metal price in future would decreased sharply and the profit margin of their plants were still hard to be promoted.

In respect of electricity price in other districts in China, the electricity price in Hunan, Guizhou, Fujian and Northeast China was above RMB0.5/KWh. High production cost caused off production of many silicon metal plants in these areas. According to survey by China Nonferrous Metals Industry Association Silicon Branch (CNIA Silicon Branch), the average operating rate of Chinese silicon plants was only 35% and that in the above districts was even no more than 15%. CNIA Silicon Branch forecasts with the decrease of silicon metal price in future market, the silicon metal plants in Hunan, Guizhou and Northeast China will stop production altogether.



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