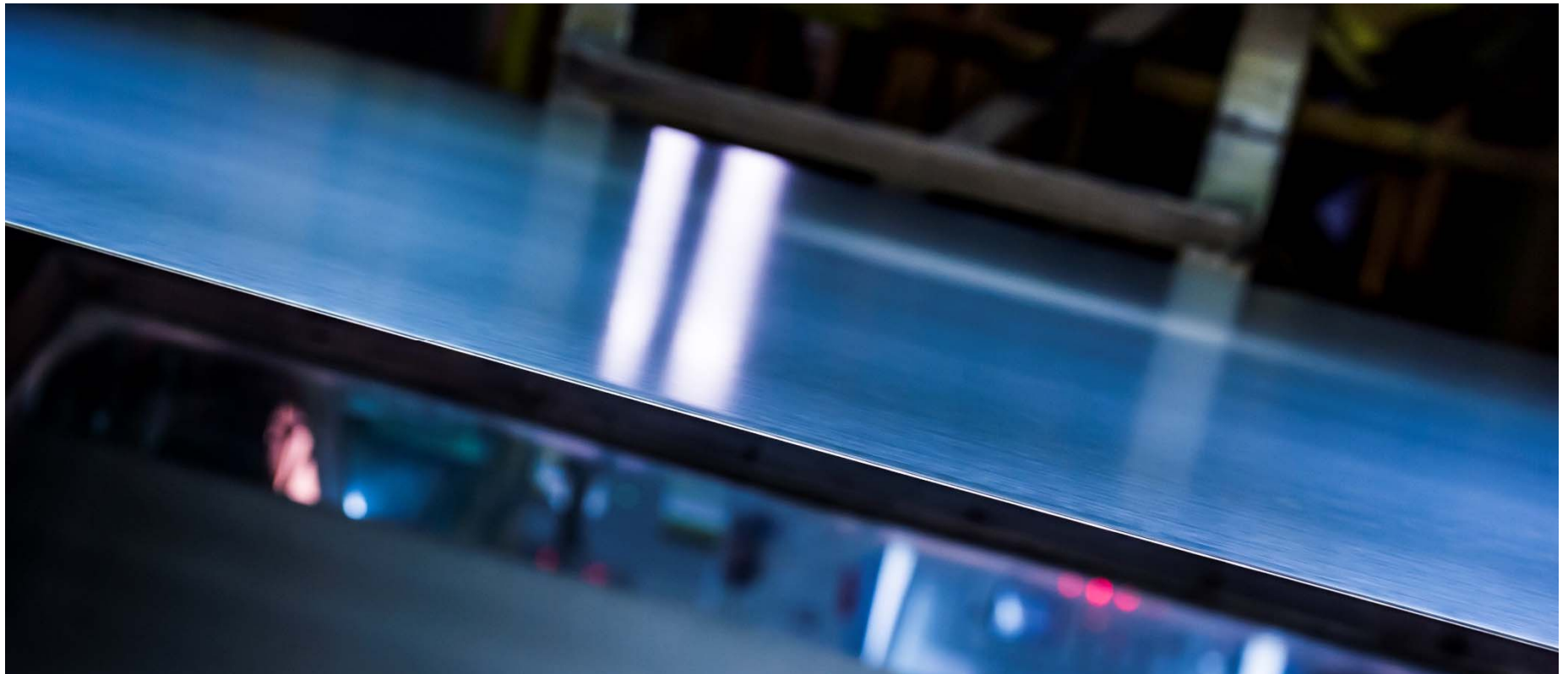


The Chinese steel industry at a crossroads

Frank Zhong, World Steel Association - China Iron Ore 2018, Beijing



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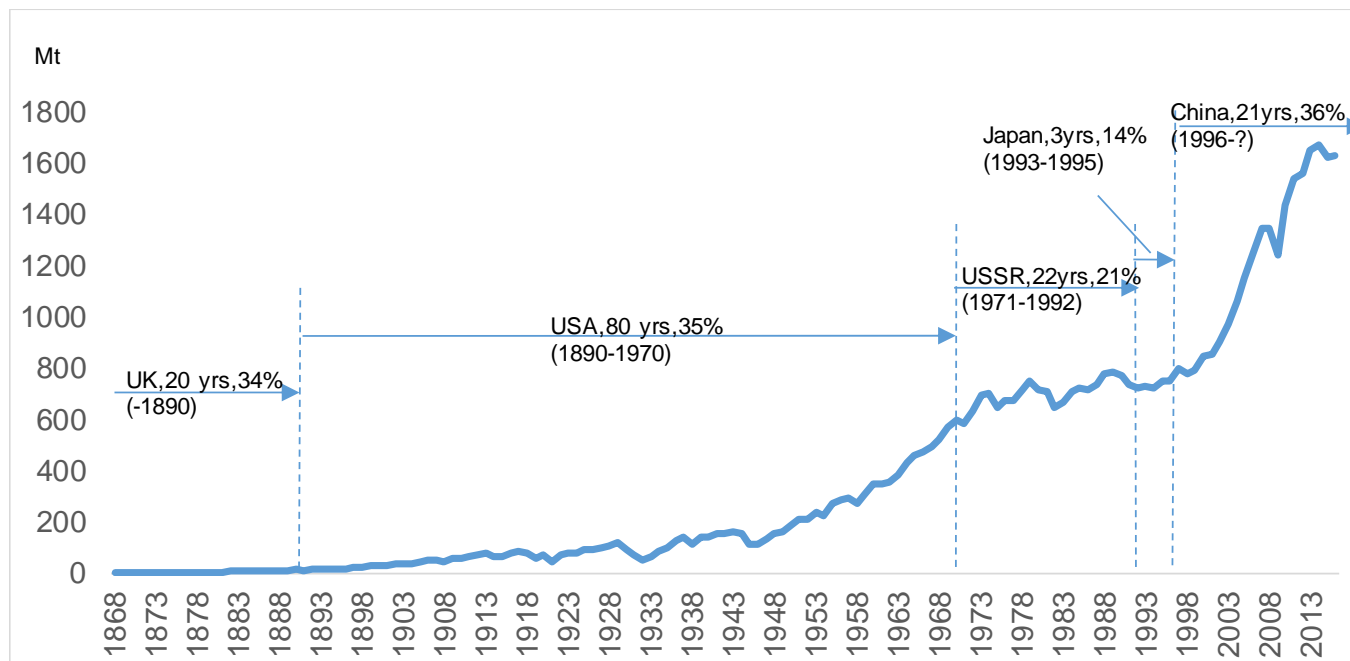
Overview of the Chinese steel industry



Global steel industry in transformation

- General view about global steel industry development:
 - The industry is facing the next big change: strong players becoming stronger, emerging players, disruptors, declining of some established players, steel production to concentrate in one region
 - No other countries will be able to replace China's role in a foreseeable future

Global Crude Steel Production and No.1 Producer's Share

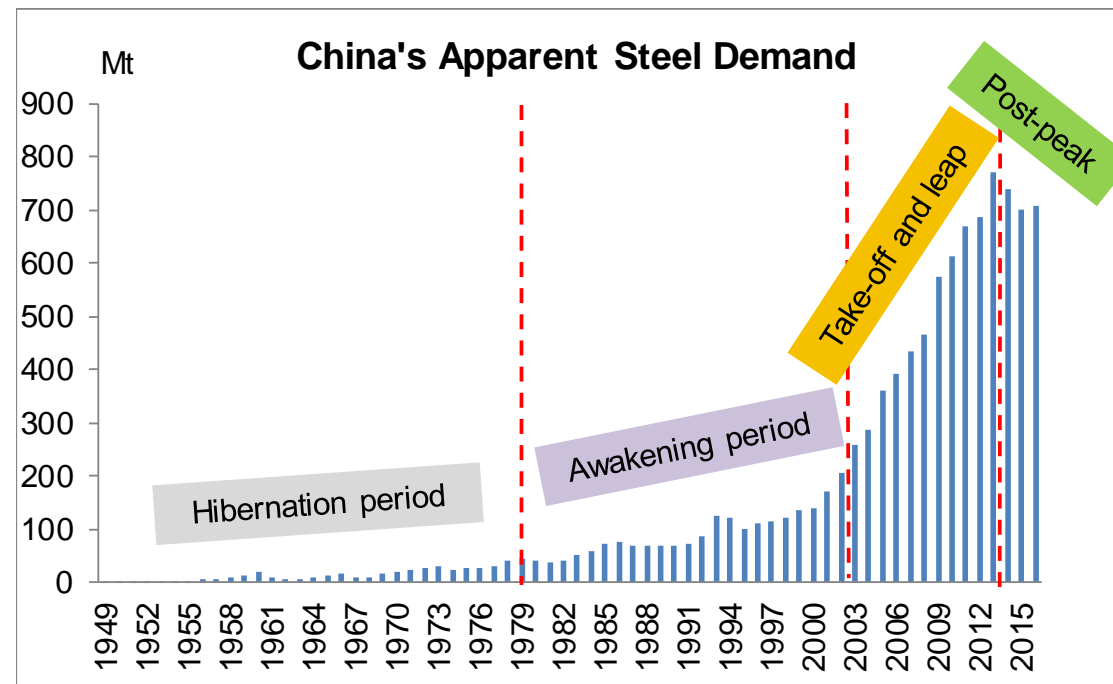


Source: worldsteel

China's steel industry has entered post-peak era

- China's steel industry development is divided into four phases in the context of the economic development
- We are now at post-peak era after a short period of take-off period, the time of high-speed growth is now over

4-Phased Development of the Chinese Steel Industry

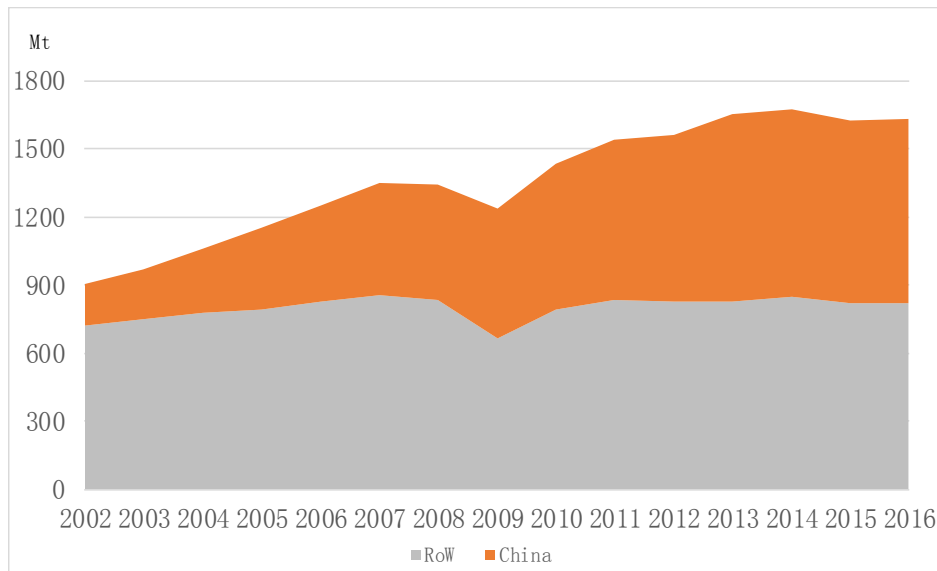


Source: worldsteel

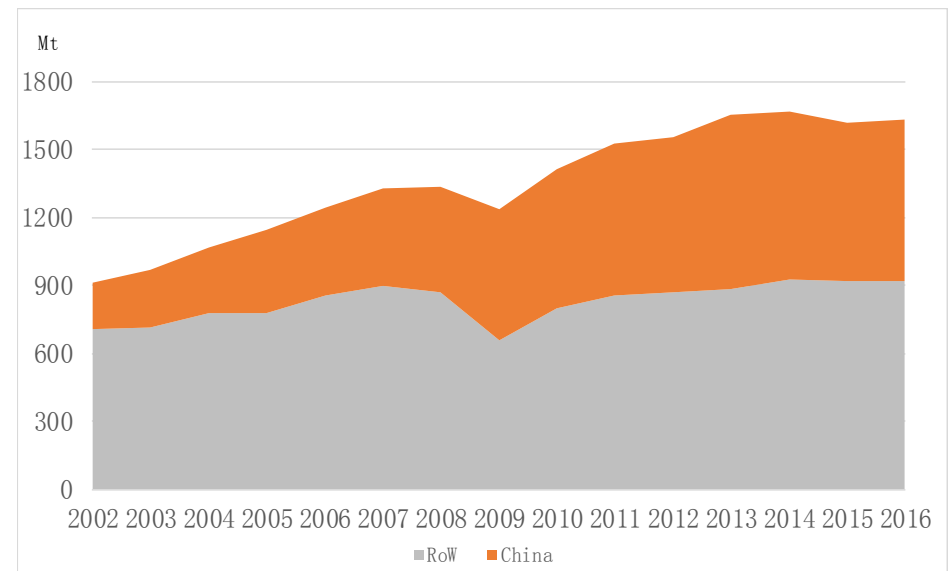
China plays a core role in global steel industry

- Steel production and consumption in RoW grew by only 14% and 30% in the past 15 years, while China's jumped by 3.4 times and 2.4 times, respectively
- China accounts for 86% of the world's increase in steel production and 70% in consumption

Crude Steel Production: China vs RoW



Apparent Steel Consumption: China vs RoW

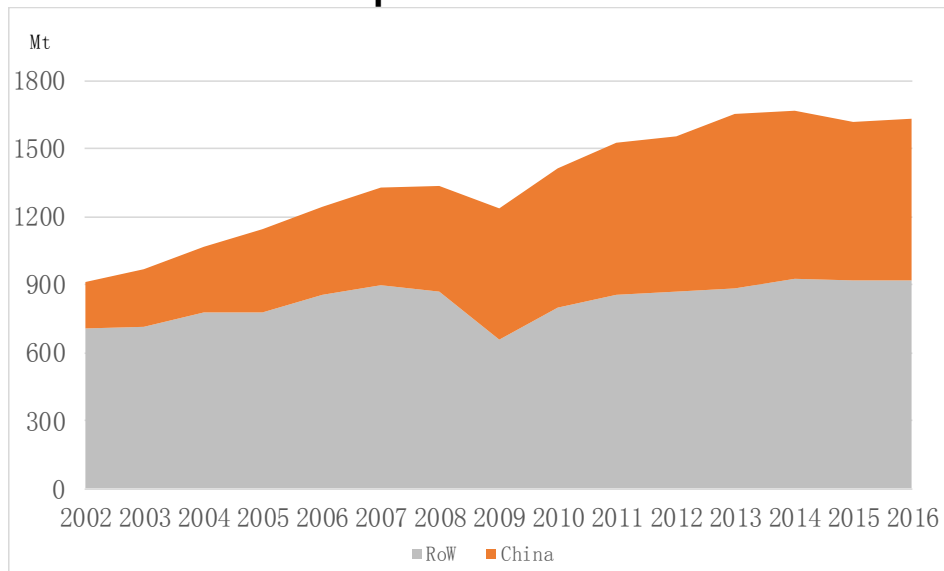


Source: worldsteel

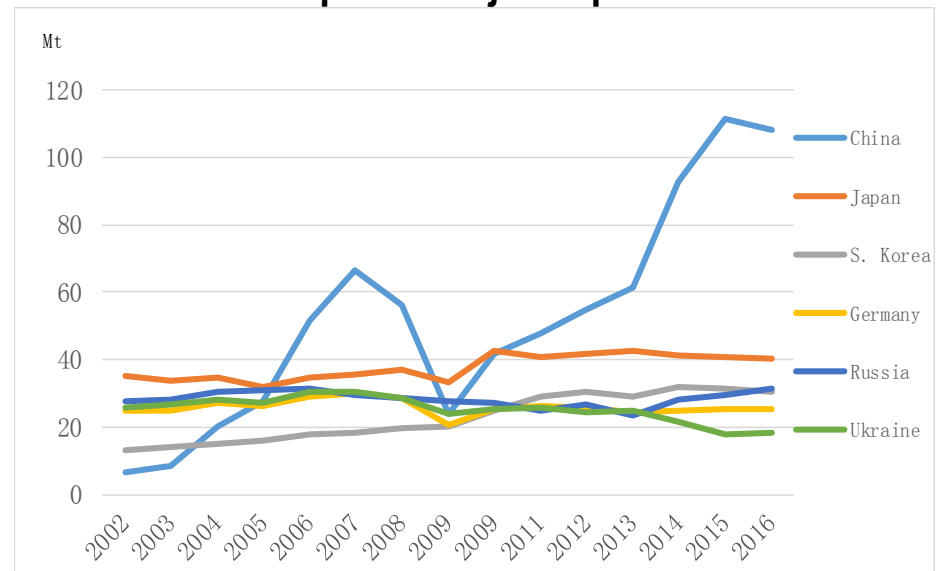
China is a key player in global steel trade

- Steel exports from RoW grew by only 17% or 53.8 Mt in the past 15 years, while China's jumped by 15.3 times of 101 Mt
- China contributed 65% of the increase in the world's steel exports

Steel Exports: China vs RoW



Steel Exports: Major Exporters

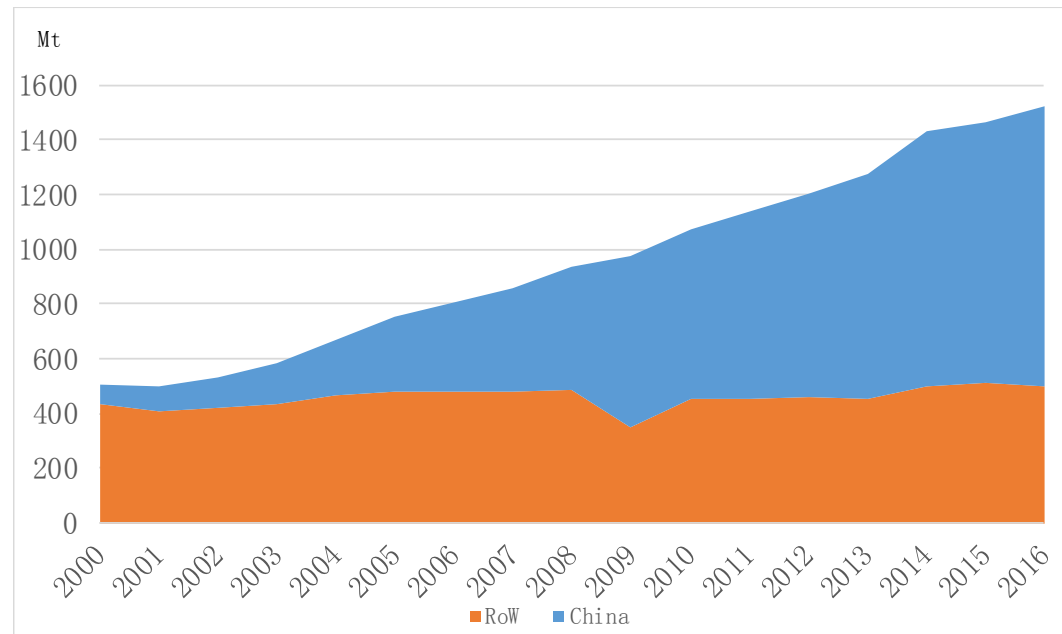


Source: worldsteel

China is the only driver in global iron ore market

- Global iron ore trade increased by 1020 Mt in the past 15 years, of which 94% or 950 Mt from China, while RoW's iron ore imports grew by only 15% or 65 Mt
- More than 95% of China's new steel capacities are BF-BOF route

Iron Ore Imports: China vs RoW

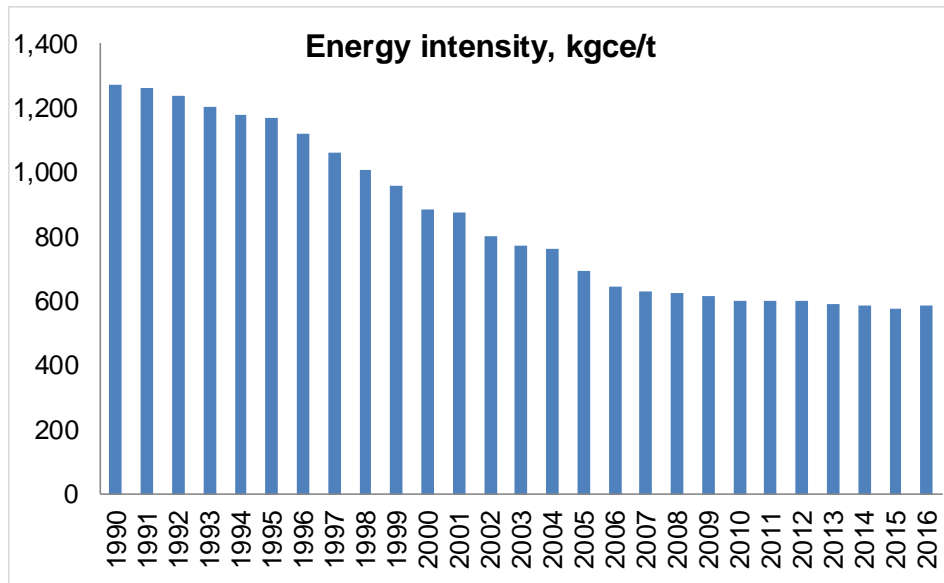


Source: worldsteel

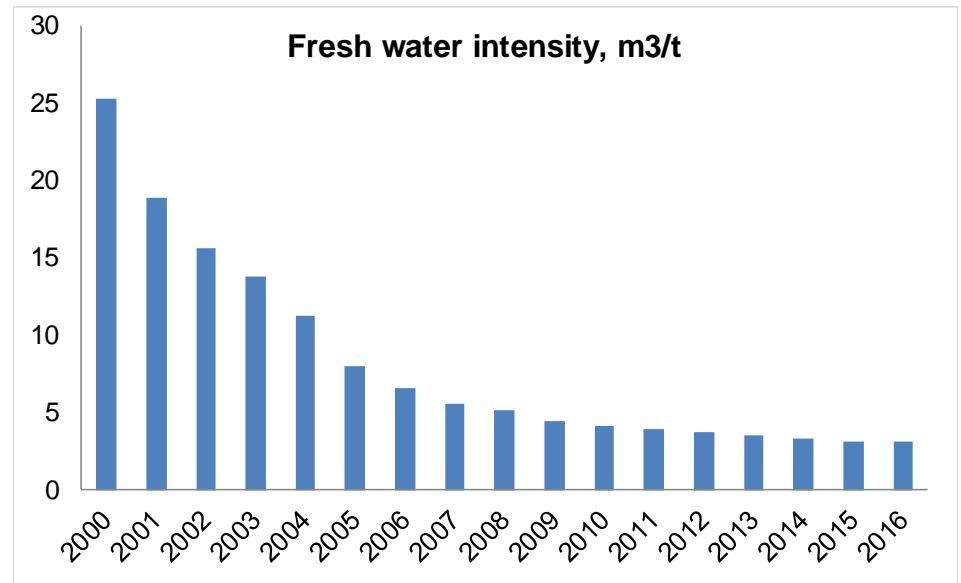
Dramatic improvement in environmental performance

- Energy intensity of mid-large steel mills declined by 27% in the past 15 years, while fresh water intensity dropped by 80%
- Not much potential for radical improvement, as it's approaching technical limits of the existing technologies

Energy Efficiency Improvement



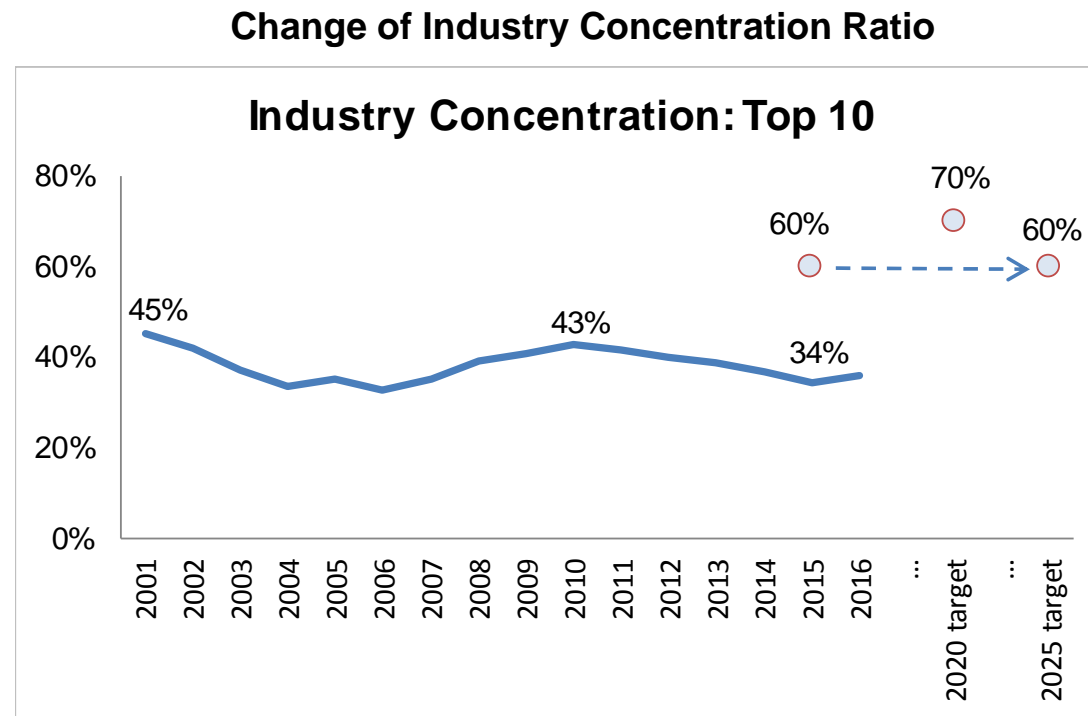
Water Efficiency Improvement



Source: CISA

Industry concentration is still low

- The largest steel producing country has the lowest industry concentration ratio
- The actual concentration ratio is far from the government's target



Source: CISA, worldsteel

Three strategic issues to be addressed

- Technology route: BOF vs EAF
- Geographical location of mills
- Ownership: SOE vs Private

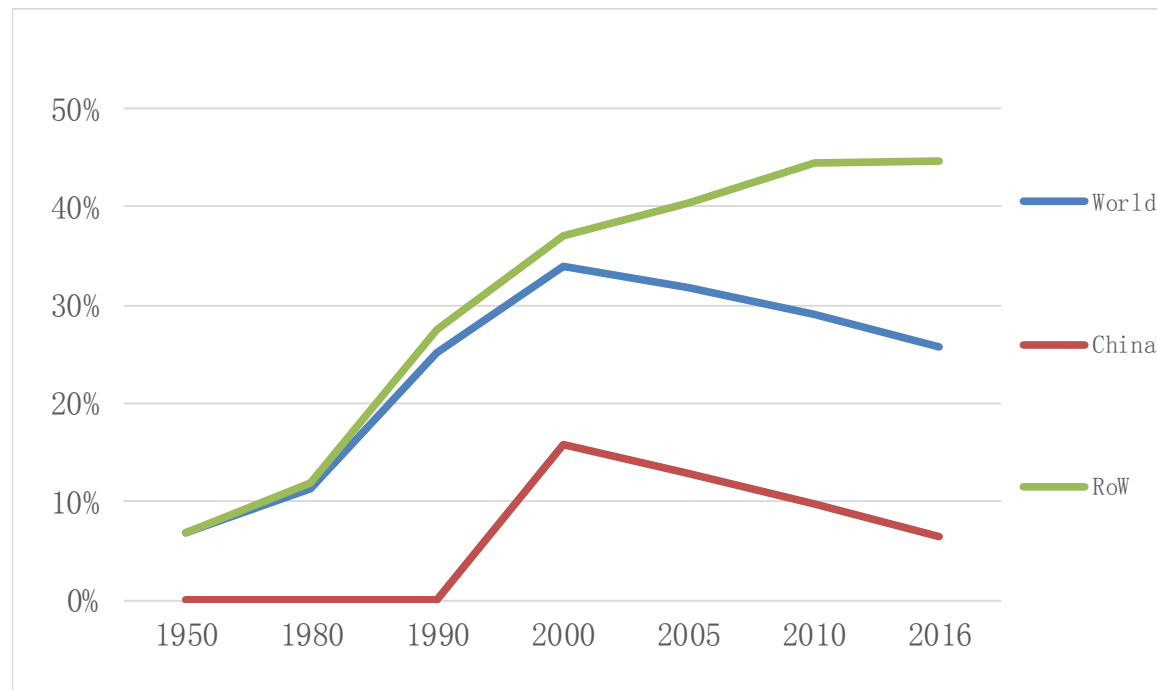
Technology route: BOF vs EAF



China drives EAF's production share down

- The rising trend of EAF's share in global steel production was changed by China since 2000
- EAF's share in RoW remains rising
- EAF's share in global steel production may post a new high by 2030

Share of EAF's Production

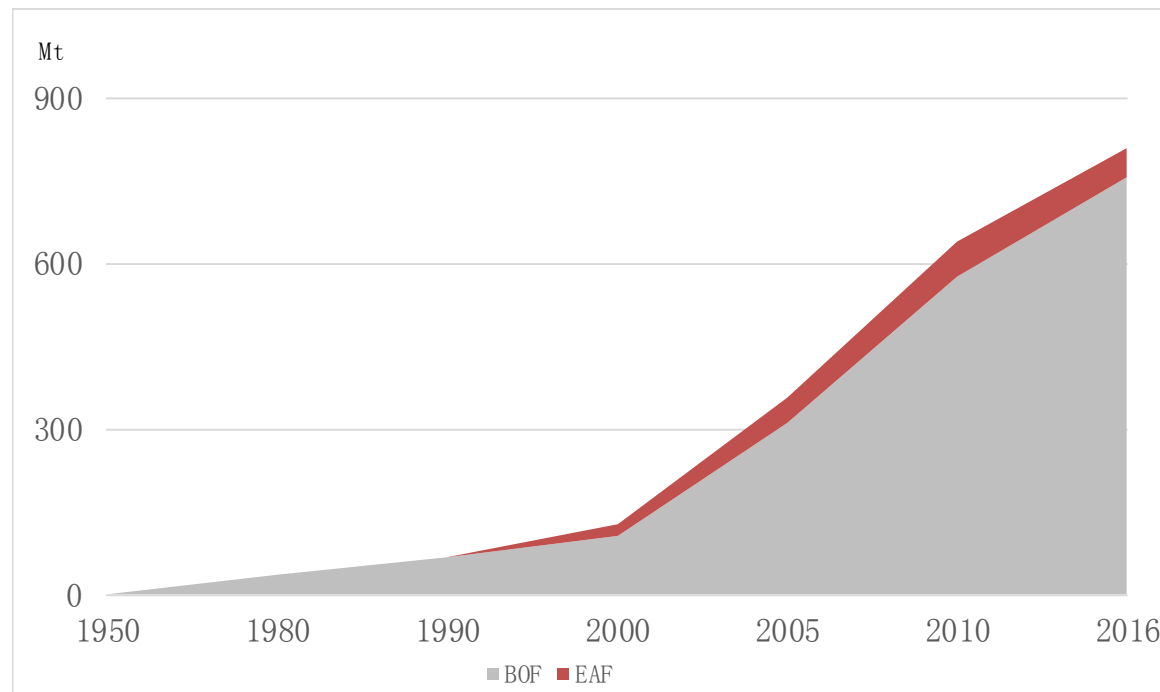


Source: worldsteel

China's EAF share to be improved

- China began EAF production in the early 1990s, but its share shrank quickly from 2003 for fast expansion of BF's
- 100% of China's steel production increase was from BF-BOF route in the past 10 years: mature BF, tight supply of power and scrap

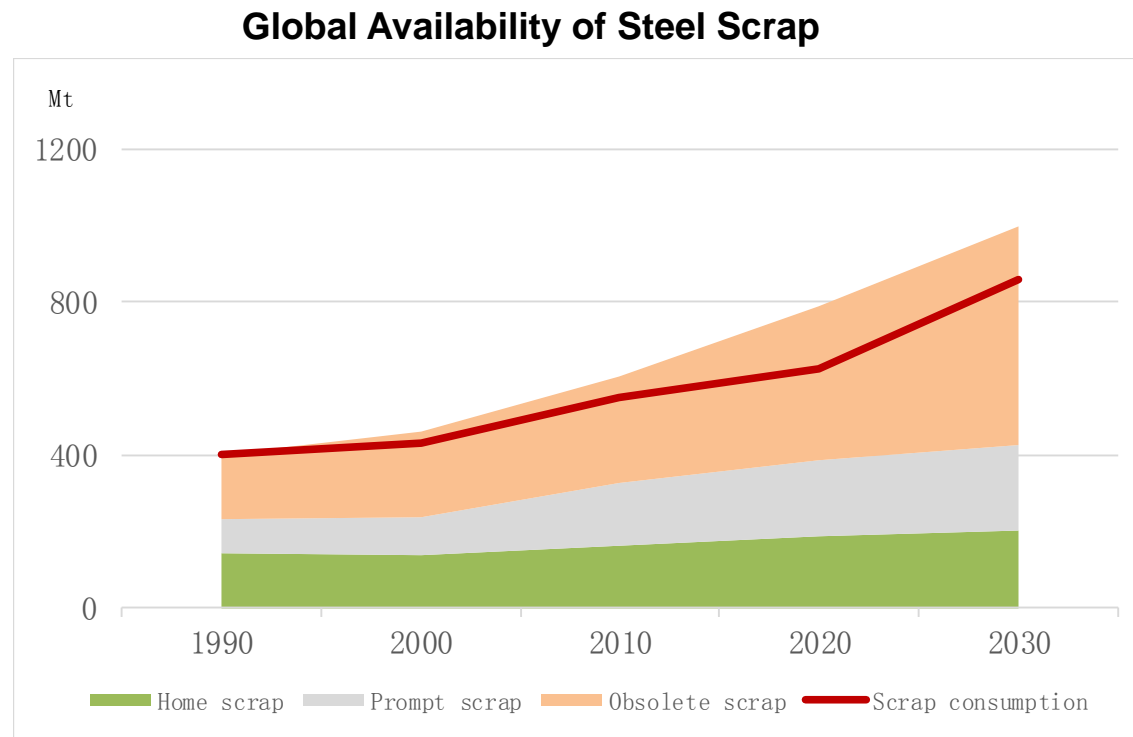
China's Crude Steel Production: BOF vs EAF



Source: worldsteel

But, global scrap supply to grow fast in the near future

- Global scrap supply on rising, scrap consumption to increase after a short break
- Obsolete scrap to become a major source of scrap supply
- Scrap to be abundant with oversupply in some regions

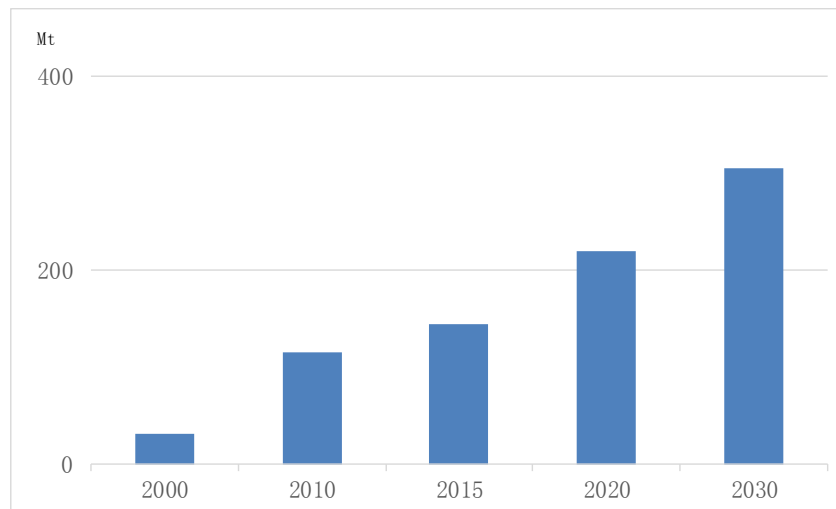


Source: worldsteel

Right time for China to use more EAF

- Scrap supply set to be sufficient, possible oversupply in the future
- Electricity supply no longer tight, oversupply in some regions
- Environmental pressure, especially carbon and water limits
- BOF or EAF: case by case, depending on scrap and power supply
- China's issue: BF-BOF capacities too new to replace, limited economic value of replacement with EAF
- Longer term: need to develop next generation technology to use both iron ore and scrap in a flexible manner

China's Availability of Steel Scrap



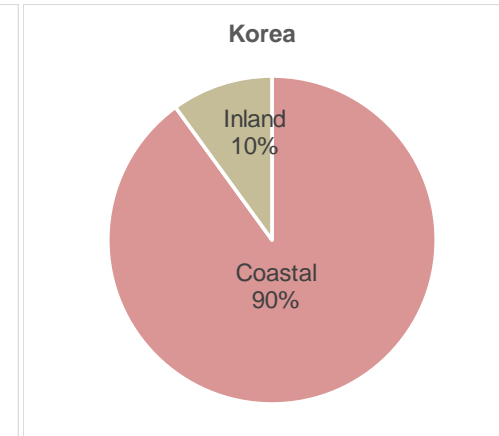
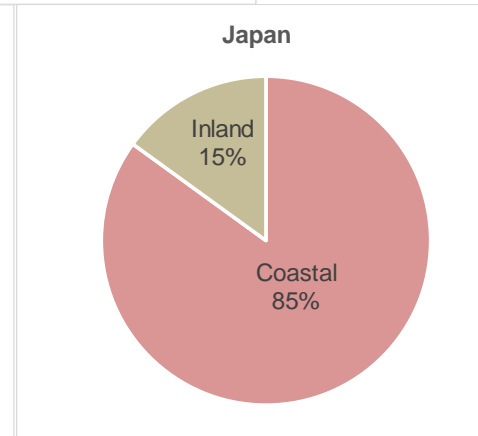
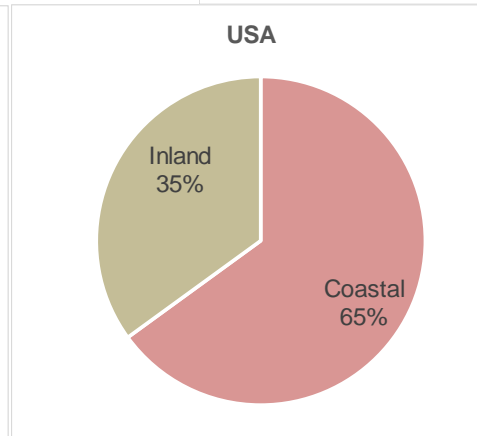
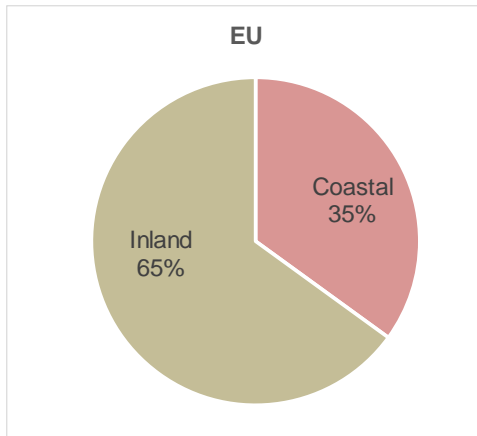
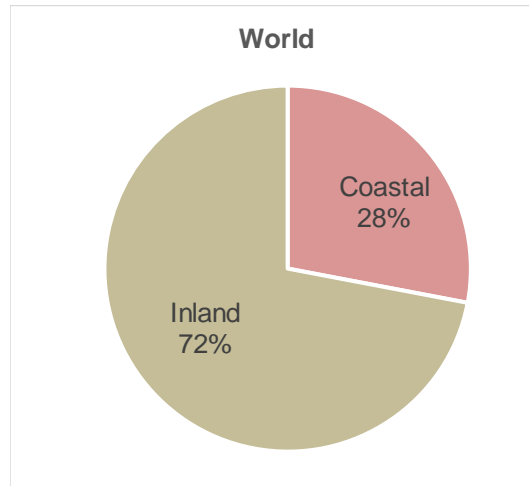
Source: worldsteel

Location: coastal vs inland, urban vs rural



Locating steel mills in coastal areas is a common practice

- Share of steel production in coast/lakeside: world average 30%, higher in Japan and South Korea

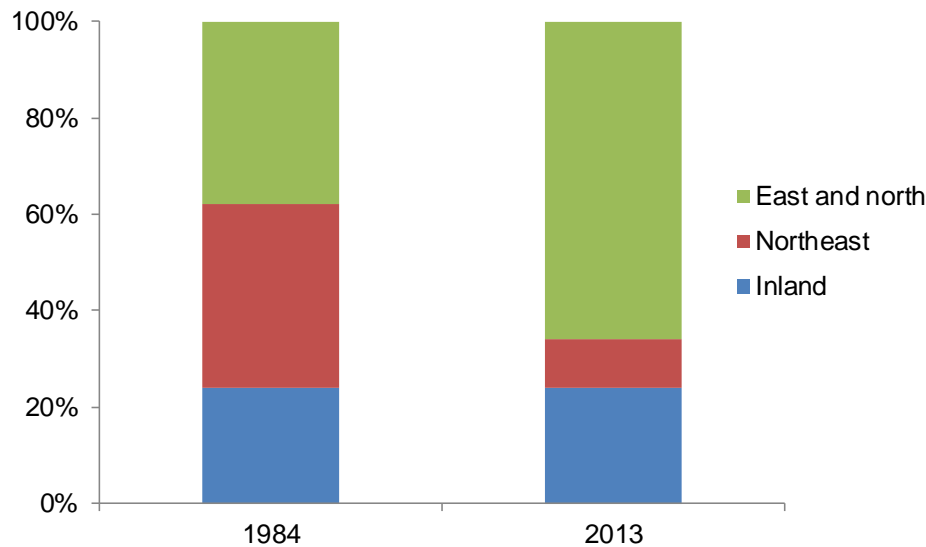


Source: estimates

Gravity of China's steel production moving to coast

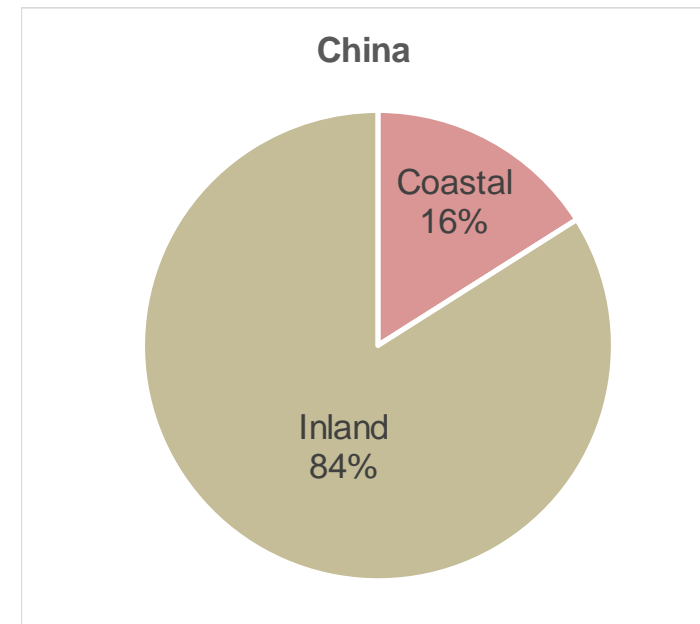
- Gravity of China's steel production has been moving from inland regions to east and coastal areas
- Port-side steel plants' share still below 20%

Regional Share of Steel Production



Source: estimates

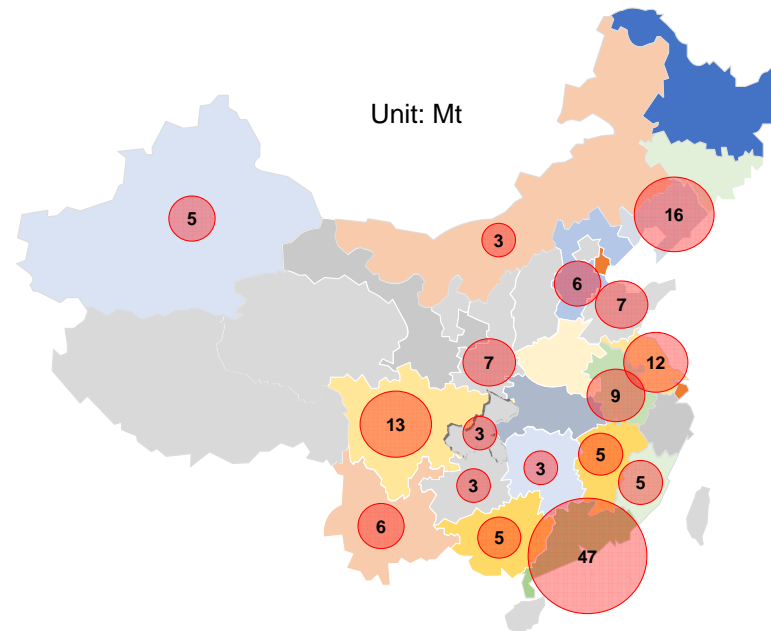
Location of Steel Production: Coastal vs Inland



Move more to coast?

- Case by case, depending on capacity and product mix
- Large mills move to concentrate on coast?
- Flat mills move to coast?
- Medium-small mills, longs producers to locate in inland/coast?
- IF's closure: indication for future location of EAF development?

IF's Capacity Closure in Major Regions

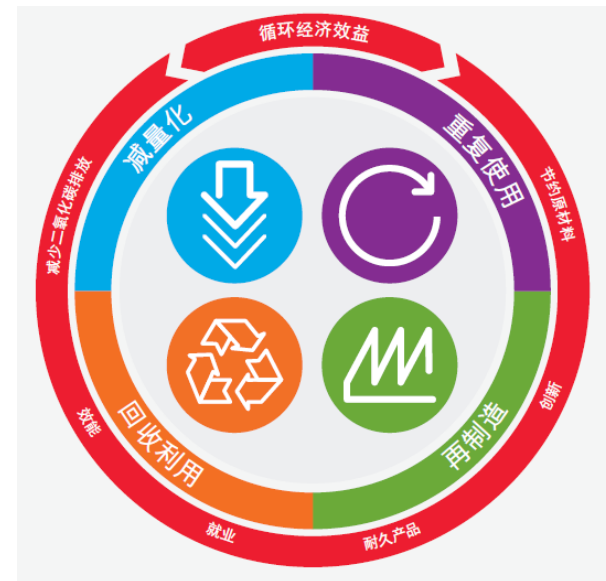


Source: estimates

Urban mills: relocation inevitable?

- Relocation of urban mills becomes a hot topic
- Relocation does not solve all problems
- Cost of relocation can be higher than return, few successful cases
- Steel mills can get along well together with local communities, as a part of solution to the economy and society, rather than a problem
- Relocation of urban mills becomes an opportunity to expand capacity?

Steel is the most **sustainable** material!
Steel is a **solution** to Circular Economy!



Ownership: SOE vs Private



Ownership changes in other countries

- USA: no SOE steel mills existing
- Japan: private mills in earlier time, nationalization in 1933 for the wars, privatization again in 1950
- South Korea: SOE in earlier time, POSCO privatized in 2000
- Europe: private mills in earlier time, nationalization after war, privatization again in 1988-1998 (SOE's share <5% in 1998)
 - UK: SOE in early 1900s, privatization in wars, partly nationalization in 1951, full nationalization in 1967, British Steel privatized again in 1988, almost nationalized again in 2016
 - woestalpine: privatization started in 1995 and finished in 2005

Most SOE steel companies are in China

- Top 50 steel companies in 2016: 18 SOE's, 16 in China
- Top 50 produced 946 Mt, of which SOE 349 Mt or 37%

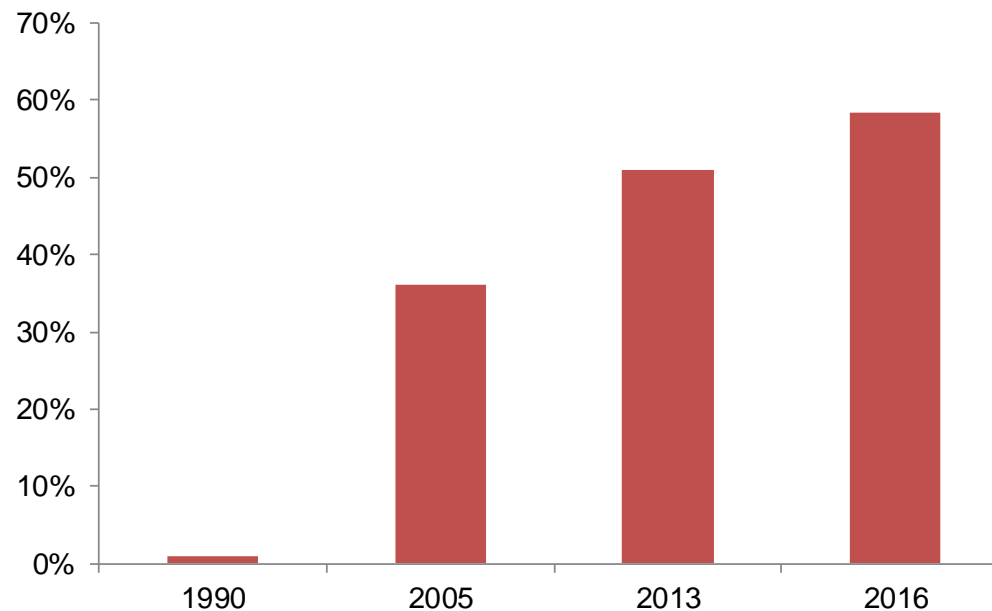
Rank	Company	2016 CSP	Rank	Company	2016 CSP
1	ArcelorMittal	95.45	26	Rizhao Steel	13.86
2	Baowu Group	63.81	27	Fangda Steel	13.68
3	HBIS Group	46.18	28	EVRAZ	13.53
4	NSSMC Group	46.16	29	MMK	12.54
5	POSCO	41.56	30	Baotou Steel	12.3
6	Shagang Group	33.25	31	Severstal	11.63
7	Ansteel Group	33.19	32	Liuzhou Steel	11.05
8	JFE	30.29	33	Jinxi Steel	11.05
9	Shougang Group	26.8	34	Jingye Steel	11.01
10	Tata Steel Group	24.49	35	Anyang Steel	10.48
11	Shandong Steel	23.02	36	Sanming Steel	10.39
12	Nucor	21.95	37	Metinvest	10.34
13	Hyundai Steel	20.09	38	Taiyuan Steel	10.28
14	Maanshan Steel	18.63	39	Zongheng	10.23
15	thyssenkrupp	17.24	40	Zenith Steel	9.24
16	NLMK	16.64	41	Erdemir	9.18
17	Jianlong Group	16.45	42	Nanjing Steel	9.01
18	Gerdau	15.95	43	Xinyu Steel	8.57
19	CSC	15.52	44	CITIC	8.4
20	Valin Group	15.48	45	SSAB	7.99
21	JSW Steel Limited	14.91	46	Techint	7.98
22	Benxi Steel	14.4	47	voestalpine	7.47
23	SAIL	14.38	48	Essar	7.45
24	U.S. Steel	14.22	49	Shaanxi Steel	7.3
25	IMIDRO	14.02	50	Kobe Steel	7.26

Source: worldsteel

Ownership change in the Chinese steel industry

- Private mills' production share has surpassed SOE's, while power of influence is still improving
- Leading private steelmakers are transforming from quantity-driven to quality-focused business strategy

Share of Private Mills' Steel Production



Source: CCCME

Advice

- Government should ensure a level playing ground for both giant SOE and leading private mills
- Privatization of steel industry does not conflict with government's guidance "Making SOE Capital Larger and Stronger"
- Longer term: privatization of steel industry is inevitable for efficiency improvement



About World Steel Association

世界钢铁协会简介

- Established as International Iron and Steel Institute (IISI) in 1967
 - 1967年成立，原名国际钢铁协会，简称IISI
- Headquartered in Brussels, with a second office in Beijing
- 总部位于比利时首都布鲁塞尔，在北京设立代表处
 - Name changed to World Steel Association (worldsteel) in 2008
 - 2008年英文名称更改，简写为 worldsteel
- Over 160 members worldwide, representing 85% of global steel production
 - 160多家会员单位，占全球钢产量85%
- 9 of the 10 largest steel companies, national and regional steel industry associations, and steel research institutes
- 全球10家最大钢铁企业中的9家已成为协会会员
- Main focus: economics, technology, environment, safety, sustainability, market development
- 主要工作领域：市场研究，技术、环境，安全生产，可持续发展，市场开发
 - Current Chairman: Kosei Shindo, NSSMC
 - 现任会长：新日铁住金柱式会社社长 进藤孝生

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