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آینده بازار آهن و فولاد چالش ها و استراتژی های پیش رو

آینده آهن و فولاد

- **April 2018 World Bank commentary:**
  - The economy is expected to maintain a steady growth of slightly over 4%, increasingly based on non-oil sectors, and fueled by a recovery in consumption and investment demand and overtaking the contribution of net exports. Some signs of pickup in the construction sector -- historically a lead in or of economic activity -- also appear to confirm this trend.
  - In the medium term, inflationary pressures are likely to increase due to a widening output gap and further currency depreciation, pushing the consumer price index (CPI) inflation into double-digit territory again.

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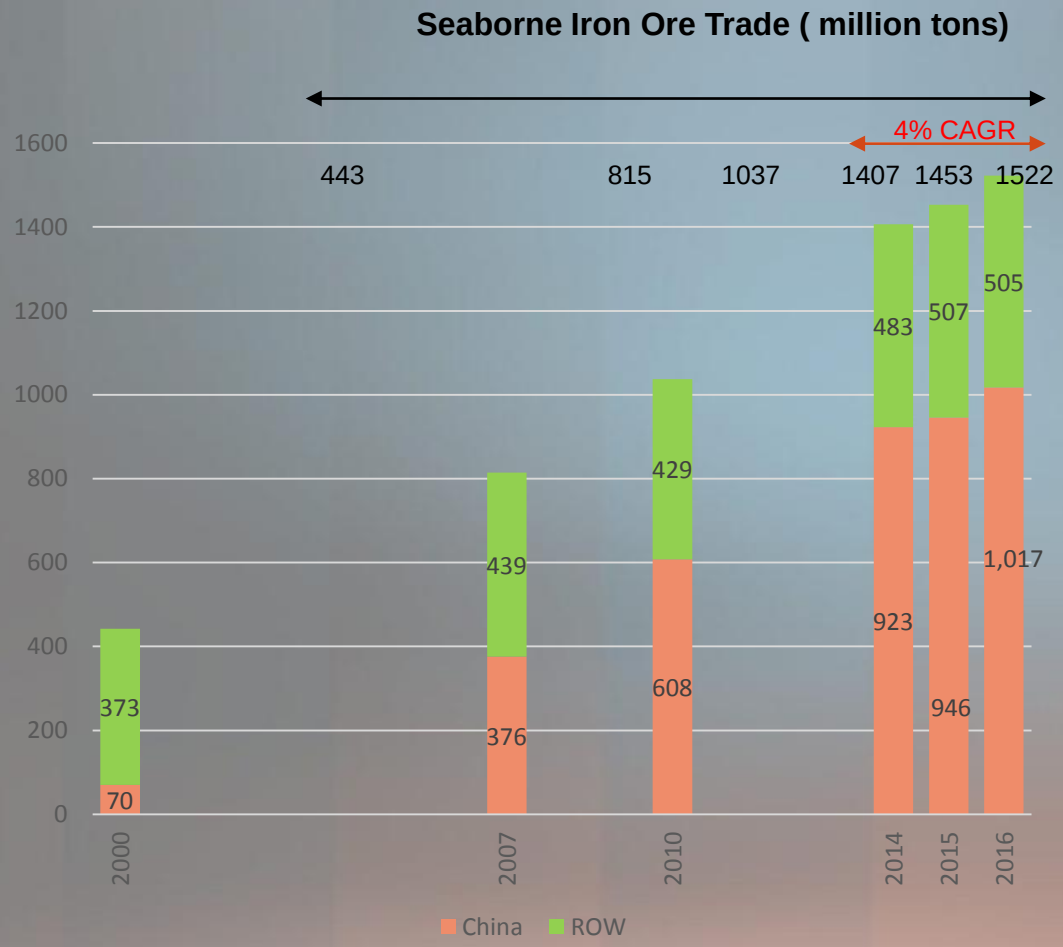
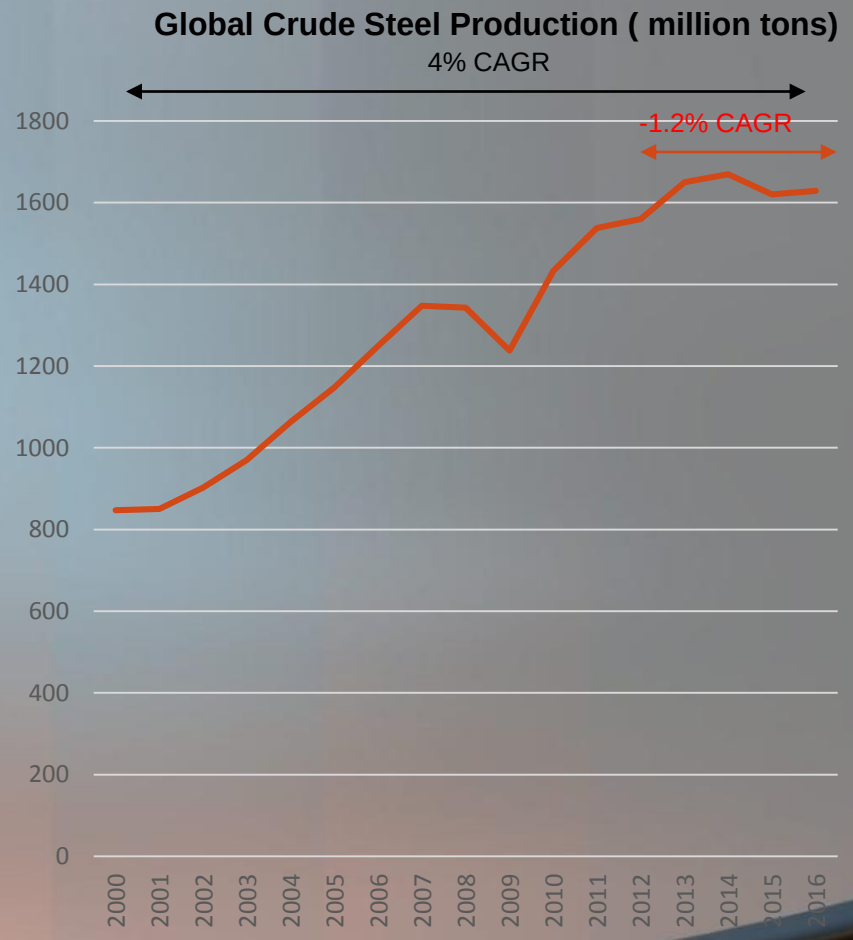
The seaborne iron ore trade has been growing at 2x global crude steel production rates. Since 2014, the trade continued to grow despite the fall in global crude steel production





Source: ISSB, WSA Steel Statistics

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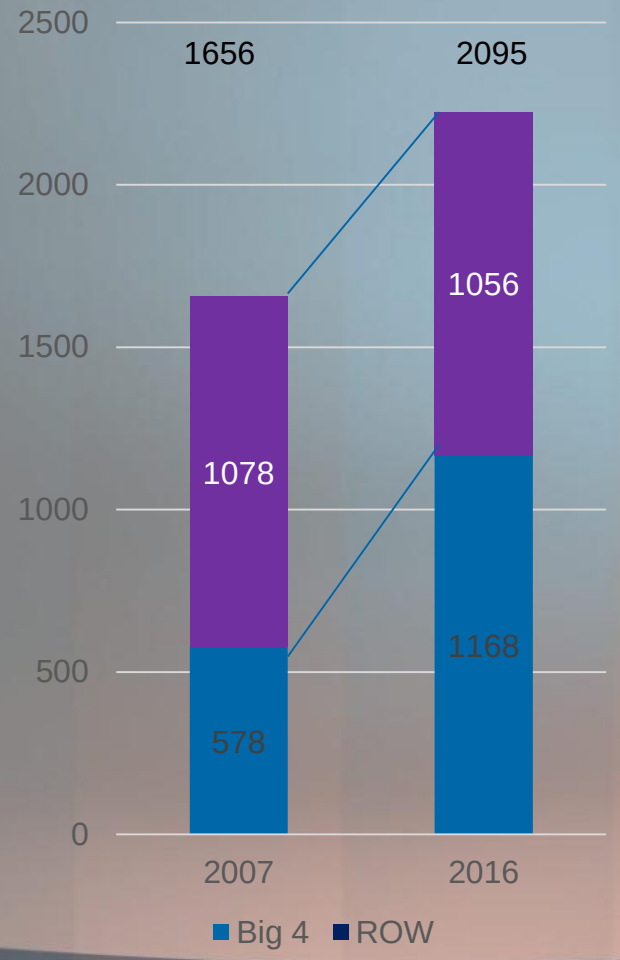
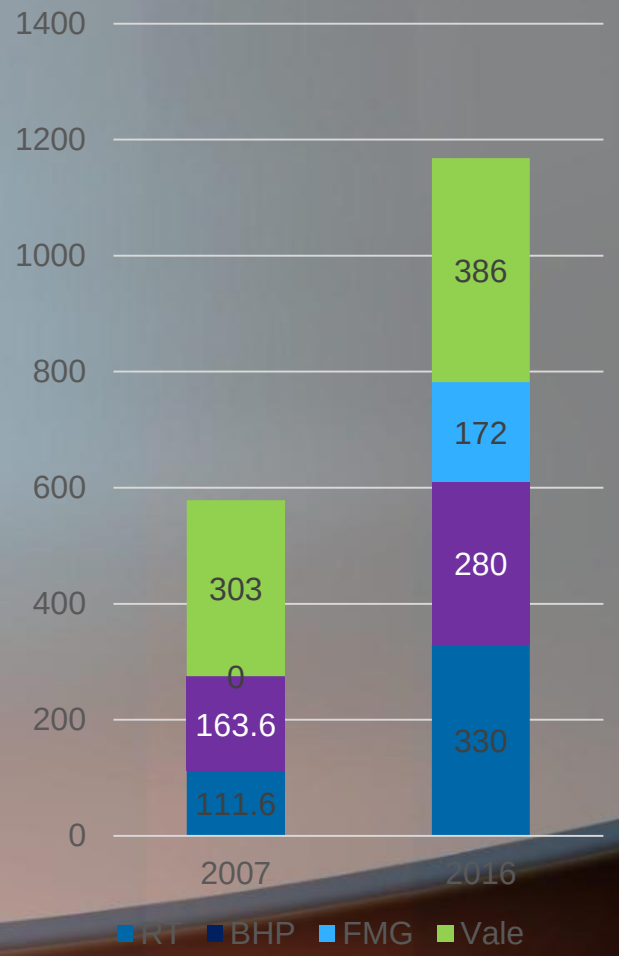
Rio Tinto alone has increased production by 218Mt, followed by start up of FMG's greenfield mines of 172 Mt

Global Iron Ore Production by Big 4 and ROW (million tons)



Change in Iron Ore Production by Big 4 , 2007-2016 (million tons)



Source : Tex Report, SNL, Hatch

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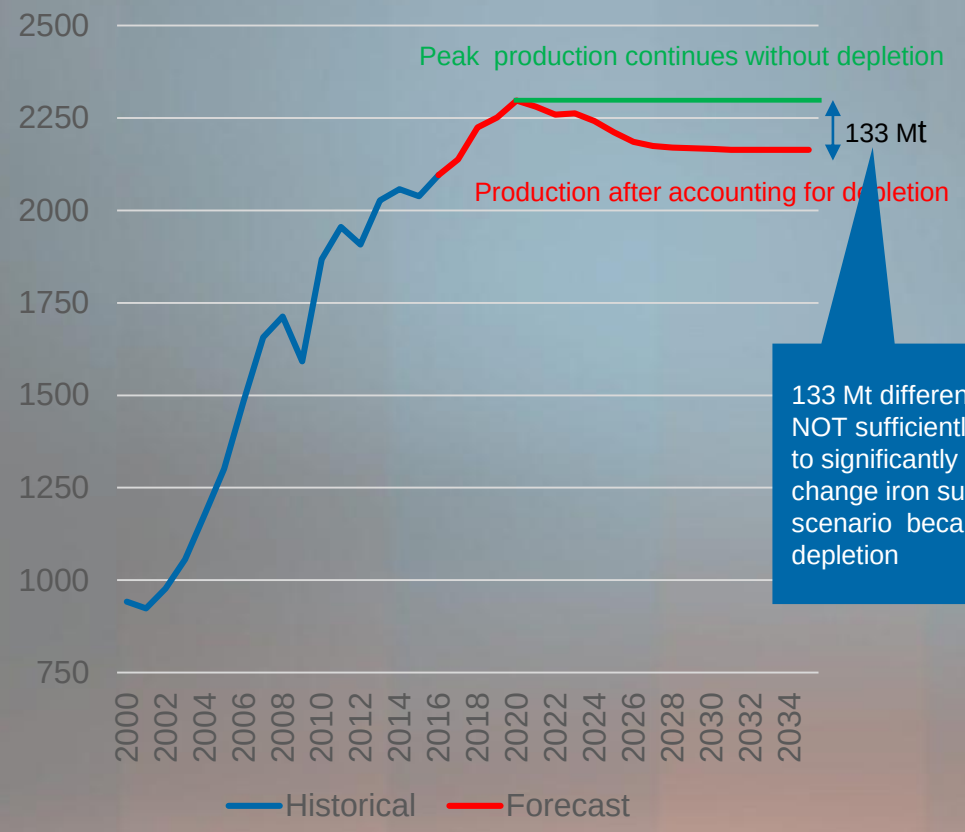
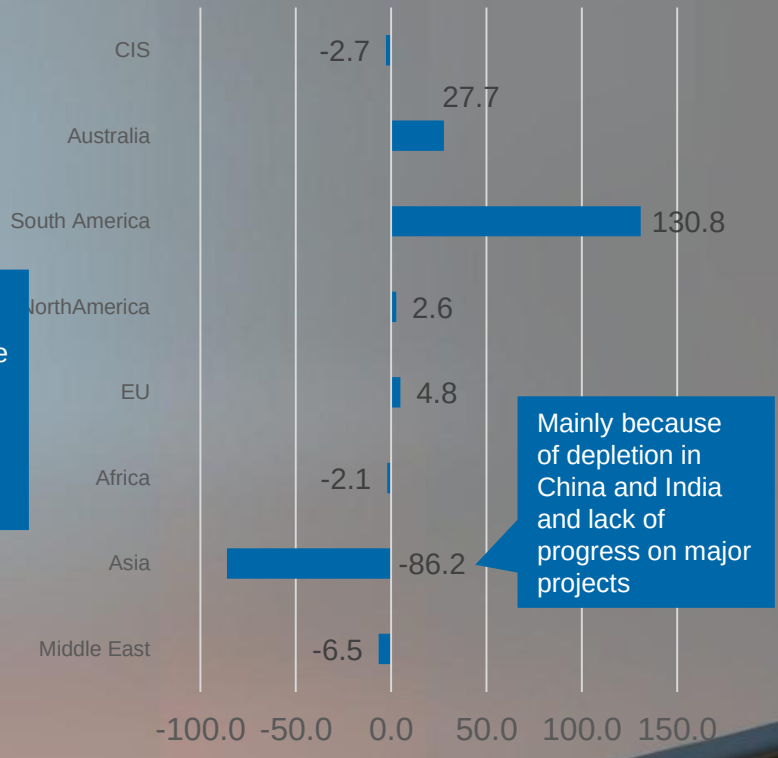
The pipeline of committed projects and associated reserves in the mines suggest that the industry can sustain production of 2.1 billion tons in the long term

Iron Ore Production Forecast (million tons)



133 Mt difference is NOT sufficiently large to significantly change iron supply scenario because of depletion

Change in Iron Ore Production 2016-2035 (million tons)



Mainly because of depletion in China and India and lack of progress on major projects

Source : Tex Report, SNL, Hatch

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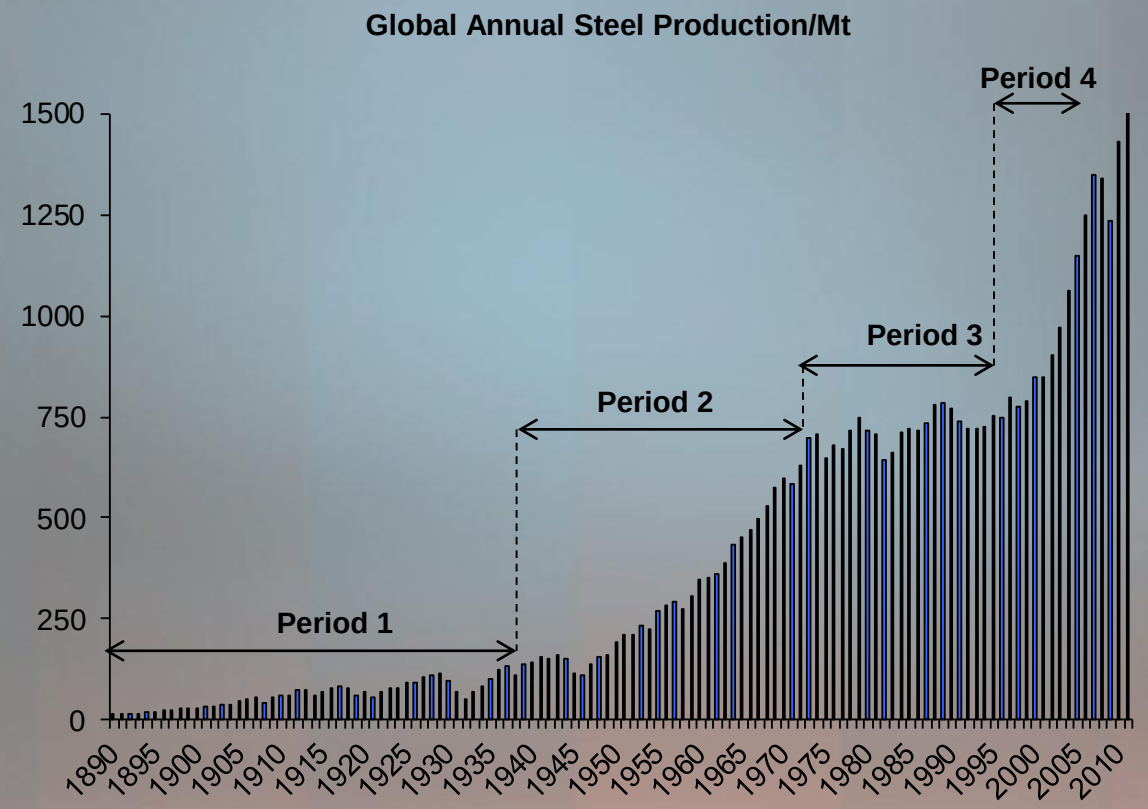
Since 1890 global steel production has grown at 4 % p.a – faster than global GDP - to over 1.6 billion tonnes within four distinct periods



Period		CAGR/%
1	1890 - 1940	4.9
2	1941 – 1974	4.7
3	1975 – 2000	1.1
4	2001 - 2016	4.4
	1890 - 2016	**4.0**

Source : WSA

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From 2015 to 2030 crude steel production is forecast to increase by 377 Mt (+ 23%). India and SE Asia will account for 90% of the growth. China's steel production could decline by 128Mt.

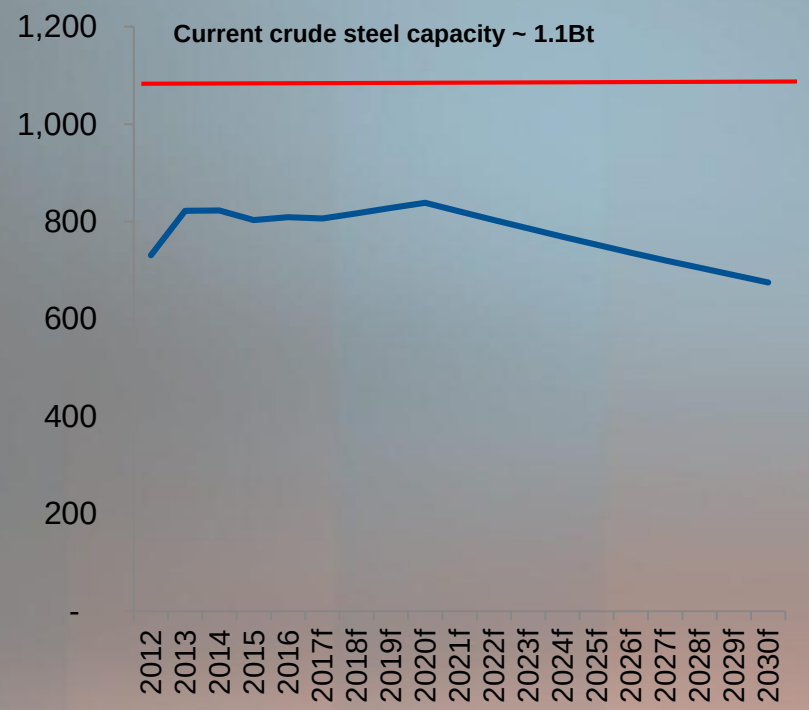
Crude steel production forecasts, Mt & CAGR%, selected years, base case

	2012	2015	2020	2030	CAGR % 2012 - 2030	Volume difference, Mt 2015 - 2030
China (incl. Hong Kong)	731.0	803.0	838.6	674.9	-0.4%	-128.1
Other East Asia	203.1	219.0	249.1	425.1	4.2%	+206.1
Europe Steel	208.5	202.0	173.8	216.0	0.2%	+4.0
CIS	111.0	101.5	136.0	126.3	0.7%	+24.8
North America	121.6	110.0	117.6	168.2	1.8%	+58.2
South America	46.4	43.9	38.8	61.4	1.6%	+17.5
Africa	15.3	13.7	25.8	49.7	6.8%	+36.0
Middle East	24.7	29.4	32.0	43.9	3.2%	+14.5
India	77.6	89.0	83.0	223.8	6.1%	+134.8
Oceania	5.8	5.7	5.5	5.0	-0.8%	-0.7
World	**1,545.0**	**1,617.2**	**1,700**	**1,994**	1.4%	377

Source : Hatch, public forecasts

The Chinese steel industry will need to restructure and reshape itself to survive the ongoing crisis before its economics return to some level of normality

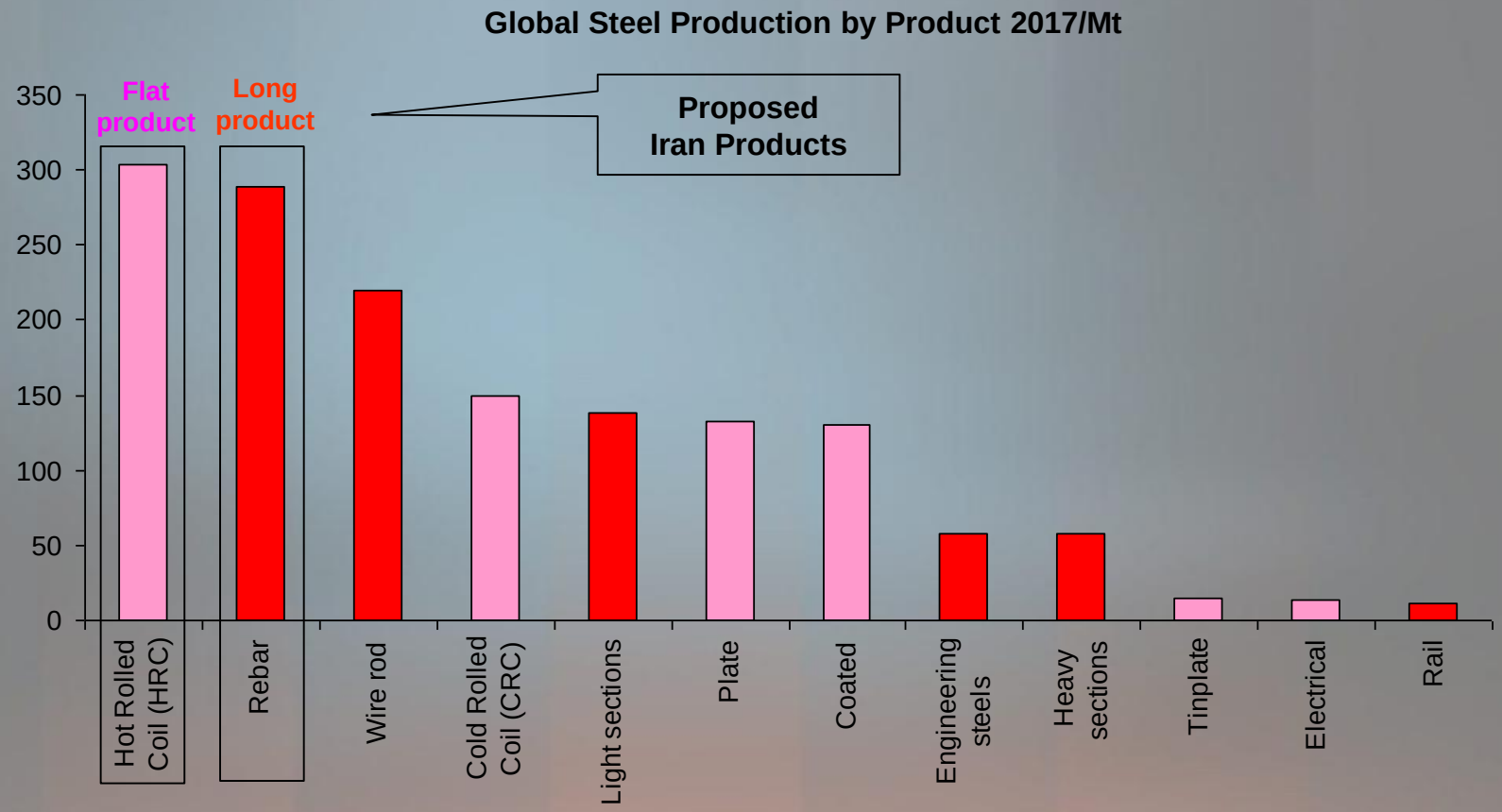
Forecast crude steel production vs. crude steel production in China (000t)



- Given China's large share and importance in the global steel industry, the changes in its industry will largely shape the global steel industry strategic landscape and economics
- Currently the capacity utilisation is about 78%
- The Chinese steel industry faces the following challenges :
  - Slower Market Growth and perhaps close to peak demand
  - Overcapacity and economic returns are weak
  - Difficult to pass raw material price increase to customers
  - Declining iron ore quality from domestic mines
  - Generating surplus to invest
  - Increasing Customer Service requirements
- The age of large step changes in capacity build up in China is largely over. This is due to:
  - Difficulties in securing finances
  - Environmental concerns
  - Weakening of the 'carte blanche' government support to the industry

Source: WSA and Hatch

The 2 proposed Iran products are the highest volume products manufactured globally: Hot Rolled Coil and rebar



- Source: worldsteel and Hatch

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The main steel consuming sectors within MENA are construction, oil & gas and equipment

Regional Steel Consumption by Region/Mt

2012	 Automotive	 Equipment	 Shipbuilding	 Construction	 Oil and Gas	 Metal goods	Total
China	81	174	28	298	37	66	**684**
CIS	6	13	2	25	8	5	**60**
Developed Asia	18	33	7	69	8	16	**151**
Eastern Europe	4	8	1	14	2	4	**33**
India	8	15	3	41	3	7	**76**
MENA	8	21	2	53	6	7	**97**
North America	17	23	5	44	9	15	**113**
Oceania	1	2	0	3	1	1	**7**
Other develop-ing Asia	7	15	2	30	4	7	**66**
South America	8	16	2	30	5	8	**70**
Sub Saharan Africa	1	3	0	5	1	1	**12**
Western Europe	19	34	5	59	7	18	**143**
Total	**180**	**356**	**57**	**672**	**91**	**155**	**1,511**

- Source: worldsteel, McKinsey and Hatch

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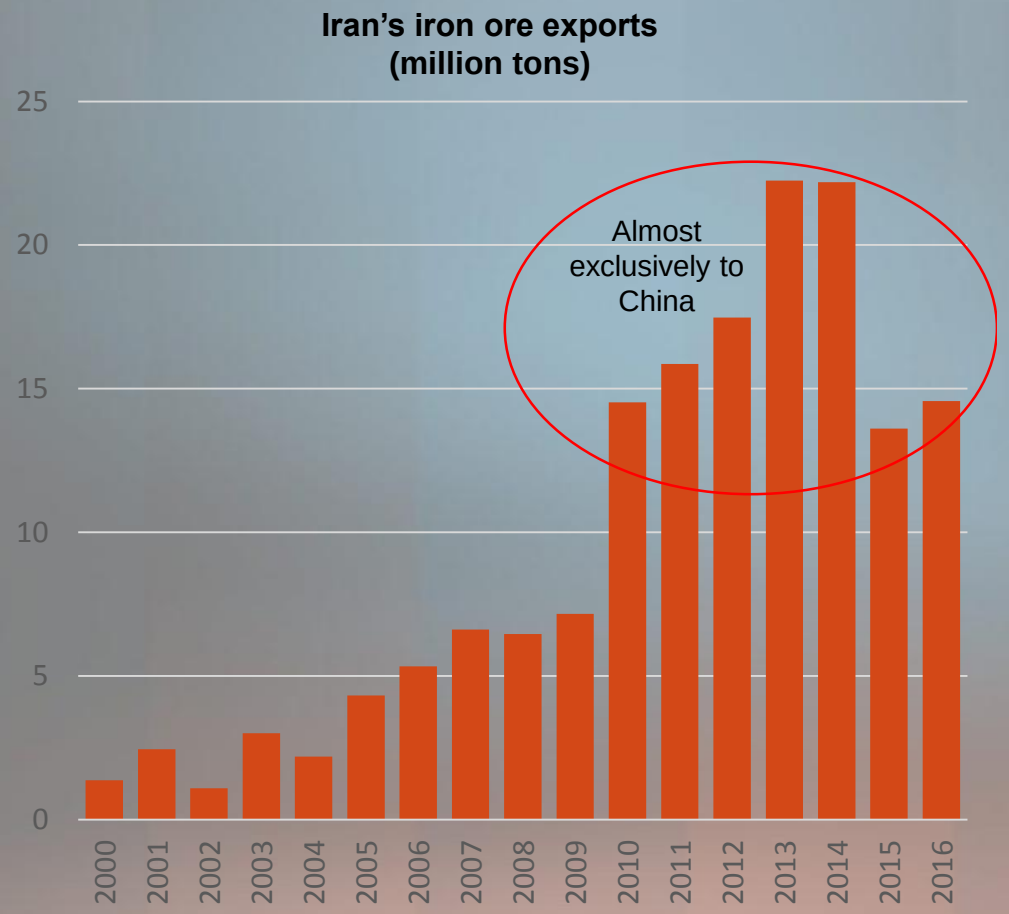
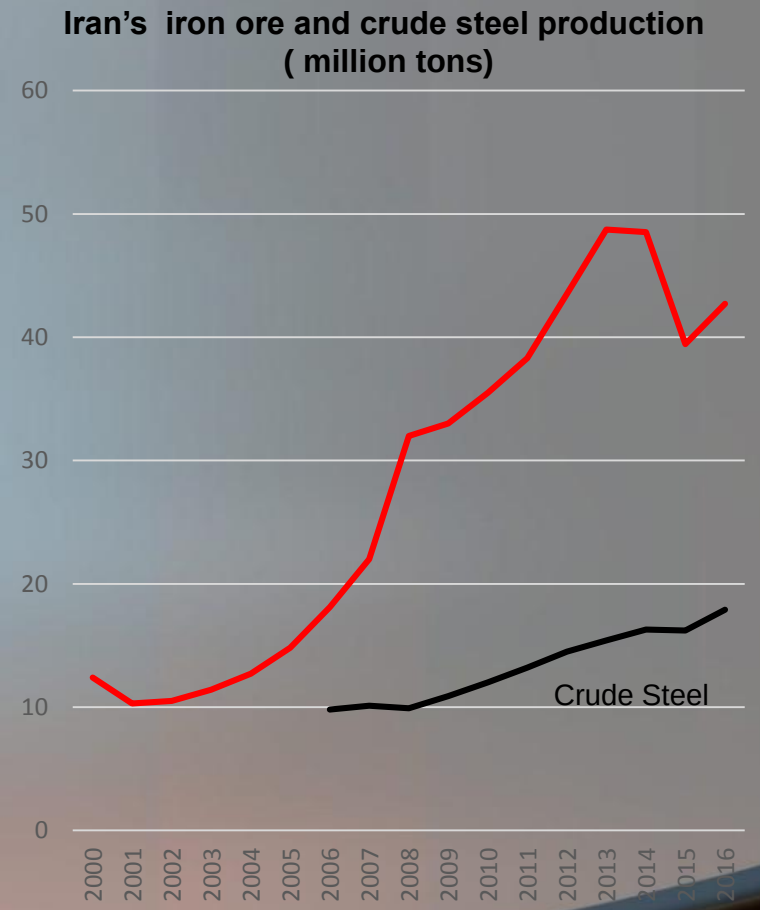
Iran's exports to China have declined by 34% since 2012, mainly due to (a) increasing demand from its domestic steel industry and (b) fall in iron ore production





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نقاط قوت و راه کارهای شرکت های ایرانی

Iran value chain, business scope

The business in this value chain benefits from several important competitive advantages:

- Conventional, name-brand, state-of-the-art mineral processing, pelletization, ironmaking and steelmaking technologies
- Low-cost domestic iron ore
- Low-cost natural gas
- Low-cost electric power
- Favorable, low Iranian Rial currency
- Good, existing infrastructure for logistics and materials handling;
- Competitive labor costs and experienced labor force

Critical input costs are benchmarked here:

Cost of energy and water in different countries

Country	Natural Gas		Electricity	Diesel fuel
	$US/m3	$US/GJ	$US/kWh	$US/L
Iran	0.034	0.96	0.018	0.09
Russia	0.057	1.61	0.04	0.7
US	0.09	2.55	0.05 - 0.07	0.7
Saudi Arabia	0.047	1.32	0.048	0.1

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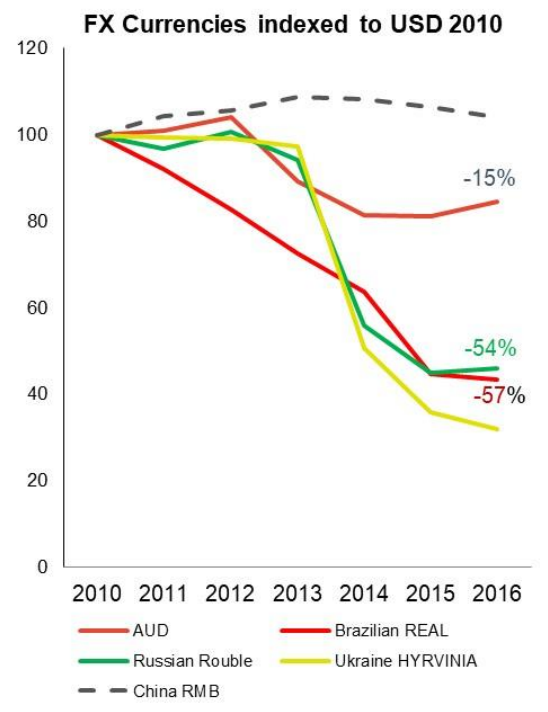
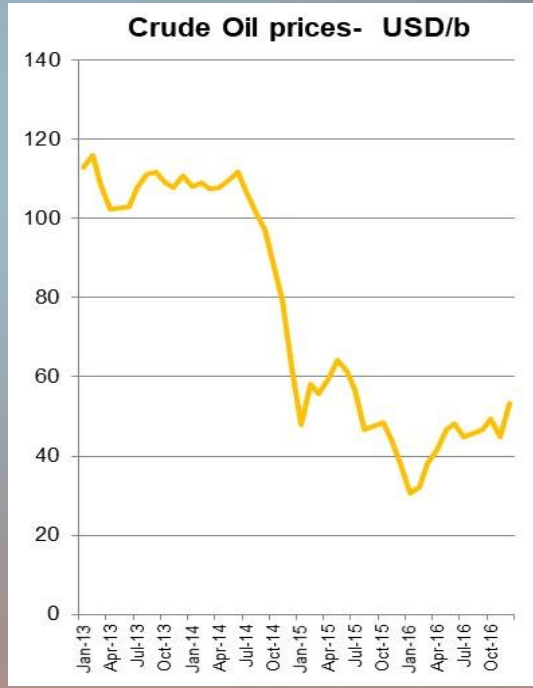
The cash costs for major iron ore exporters in Brazil, Australia, has reduced due to a combination of factors – currency depreciation, reduced fuel costs and cost reduction initiatives

1. Depreciating currencies



2. Reduced Fuel Costs



3. Sustained Cost Reduction Initiatives

Examples – Rio Tinto

- Reduced contractor hiring
- Reduction in Travel Costs
- Achieving production increase without headcount increase
- Reduction in training and assessment activities
- Micro attention to cost structure savings

Source: Platts, EIA. IMF, Rio Tinto Investor Materials

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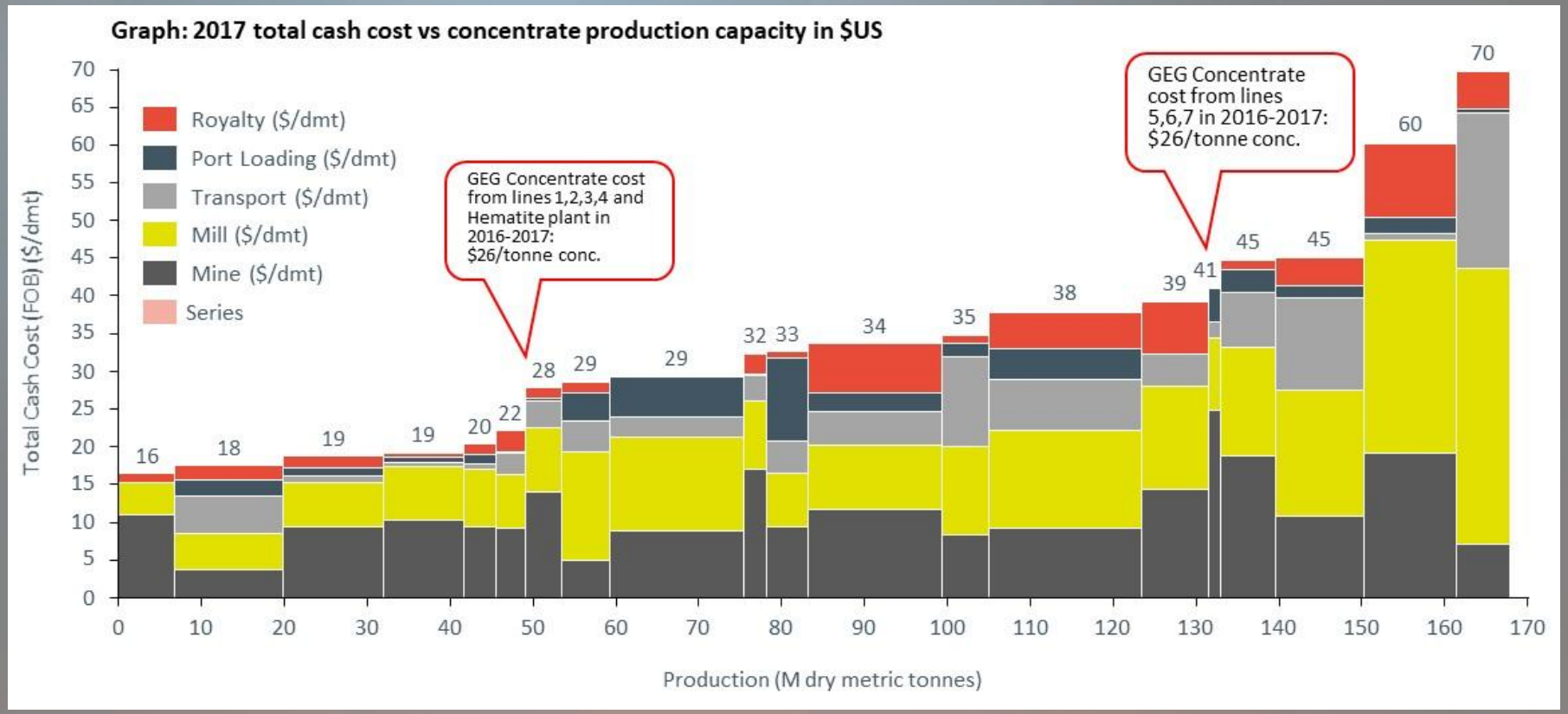
Cash Cost for Concentrates and Iran's position on the cost curve



Source: SNL Mine Economics Cost Curve – Iron Ore

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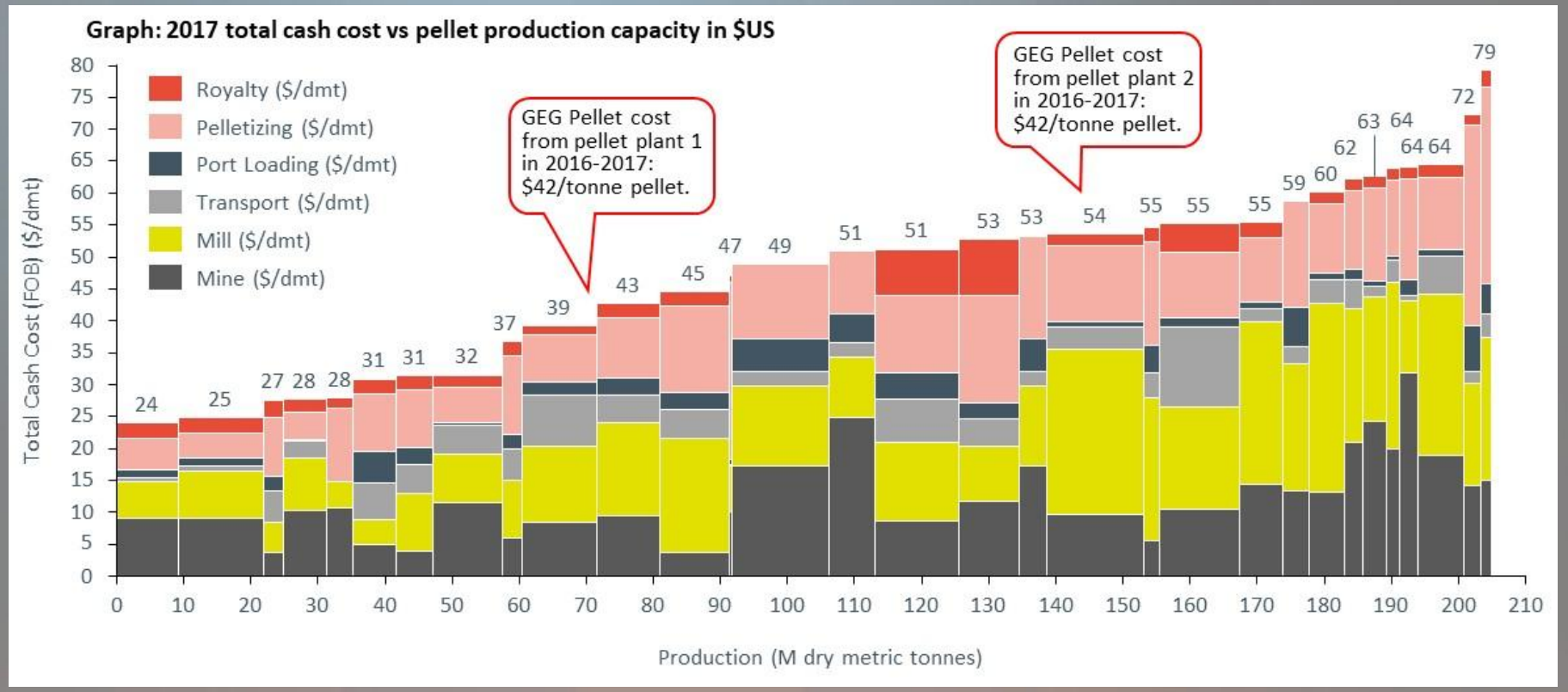
Cash Cost for Pellets and Iran's position on the cost curve



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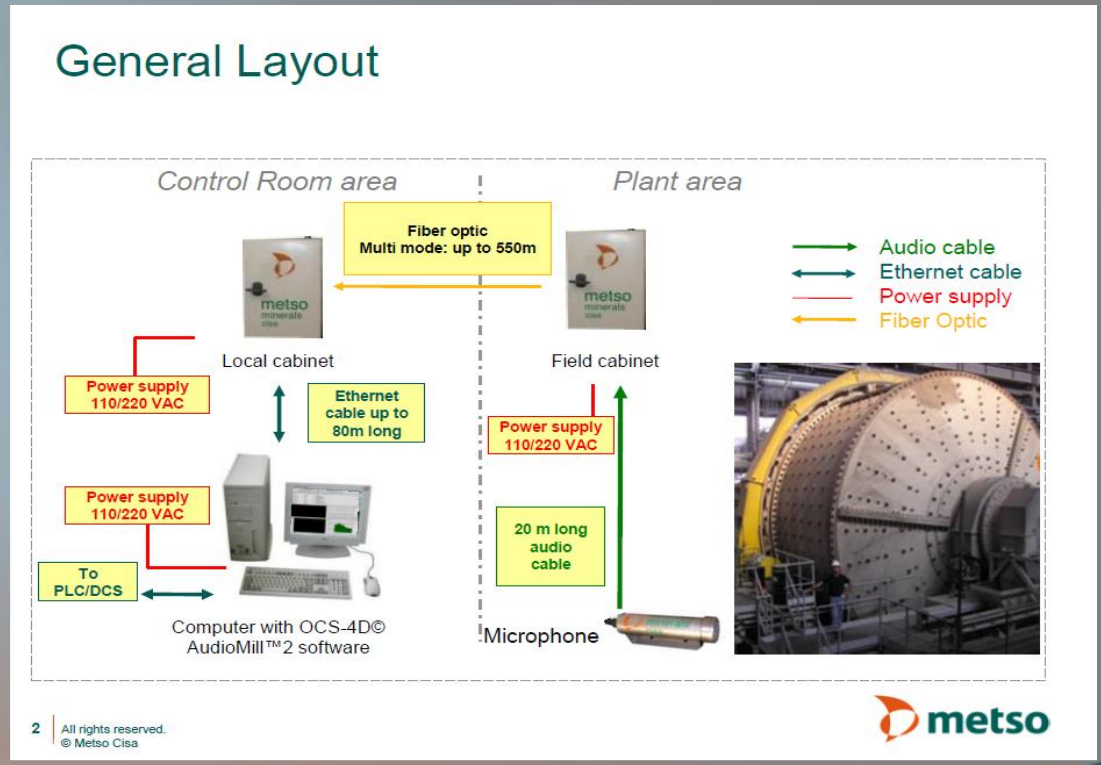
استفاده از تکنولوژی نسل چهار

- Reduction in production fluctuation 40%
- Production Quality Increase 30%
- Increase Efficiency 5%
- Reduction in Energy consumption 5%
- Production Quantity Increase 6%
- Water Consumption Reduction 3%



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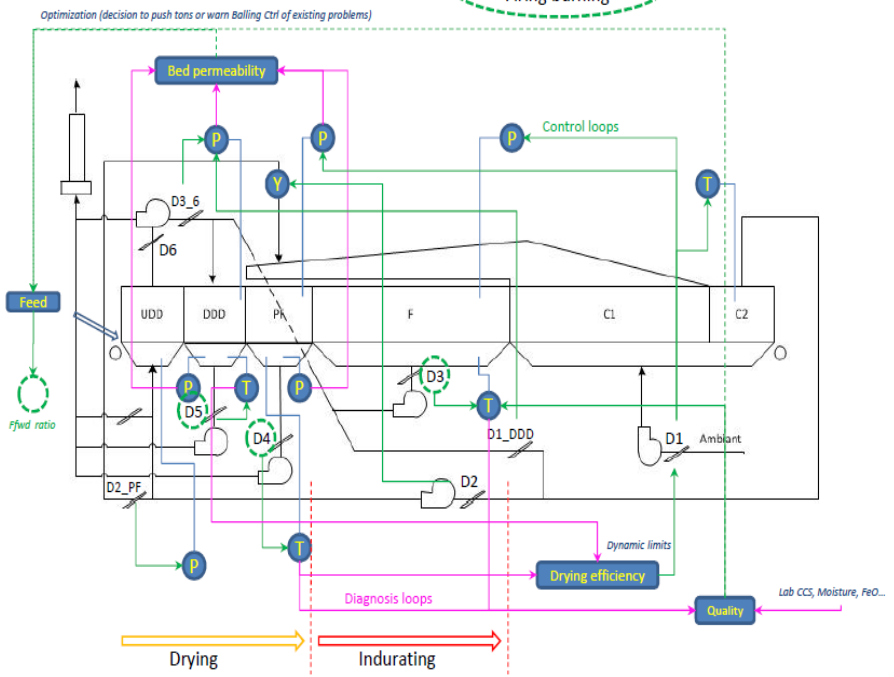
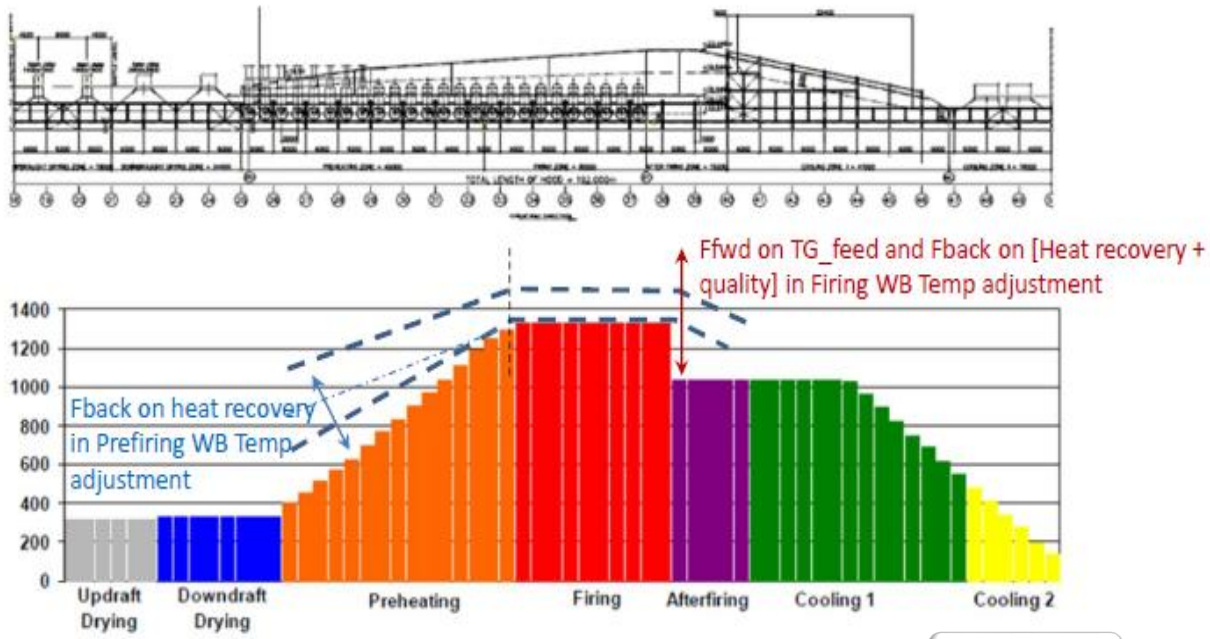
Expert control strategy

Pressure and Temperature control manipulating:
- Dampers
- Preheat Burners
- Firing burning



Outotec
More out of ore

Pellet Induration



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شبیه سازی و شناسایی گلوگاههای افزایش تولید

		Mine 1 - 254 mm Diameter Holes	
		Structure	
		Fine In-situ block size < 0.47 m RQD < 45%	Coarse In-situ block size > 0.47 m RQD > 45%
Strength	Hard UCS > 90 MPa	Domain H 4.0 x 4.5 m ST = 4.0 m SD = 1.5 m PF = 0.61 kg/t Explosive Emulsolite	
	Medium UCS 50 - 90 Mpa	Domain MF 4.5 x 5.0 m ST = 4.0 m SD = 1.5 m PF = 0.49 kg/t Explosive Emulsolite	Domain MC 4.0 x 5.0 m ST = 4.5 m SD = 1.5 m PF = 0.52 kg/t Explosive Emulsolite
	Soft UCS < 50 MPa	Domain S 5.0 x 6.5 m ST = 4.5 m SD = 1.5 m PF = 0.32 kg/t Explosive Emulsolite	

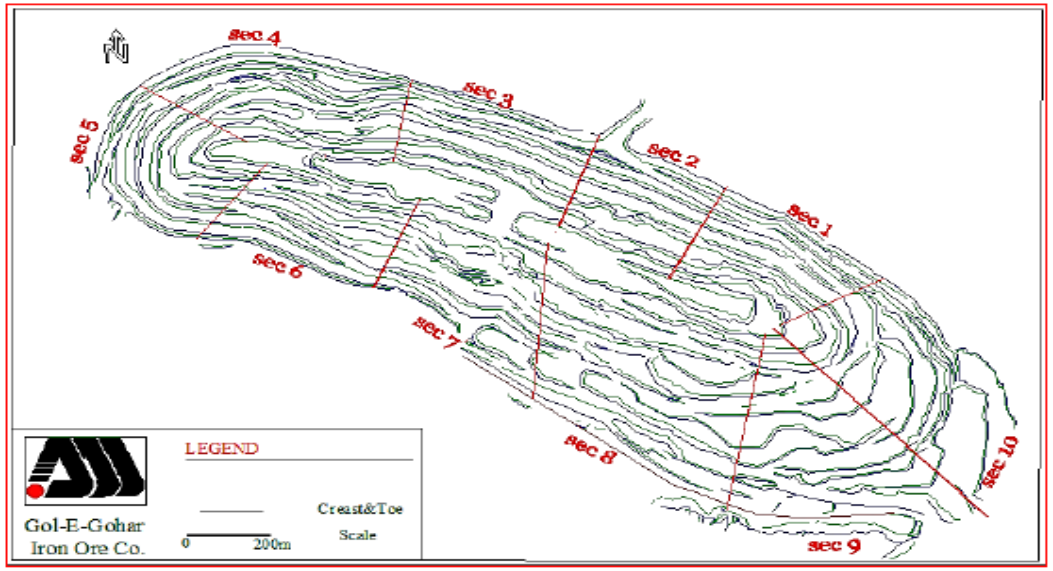

Figure 2-3: Golgohar Mine 1 Open Pit Geotechnical Domains

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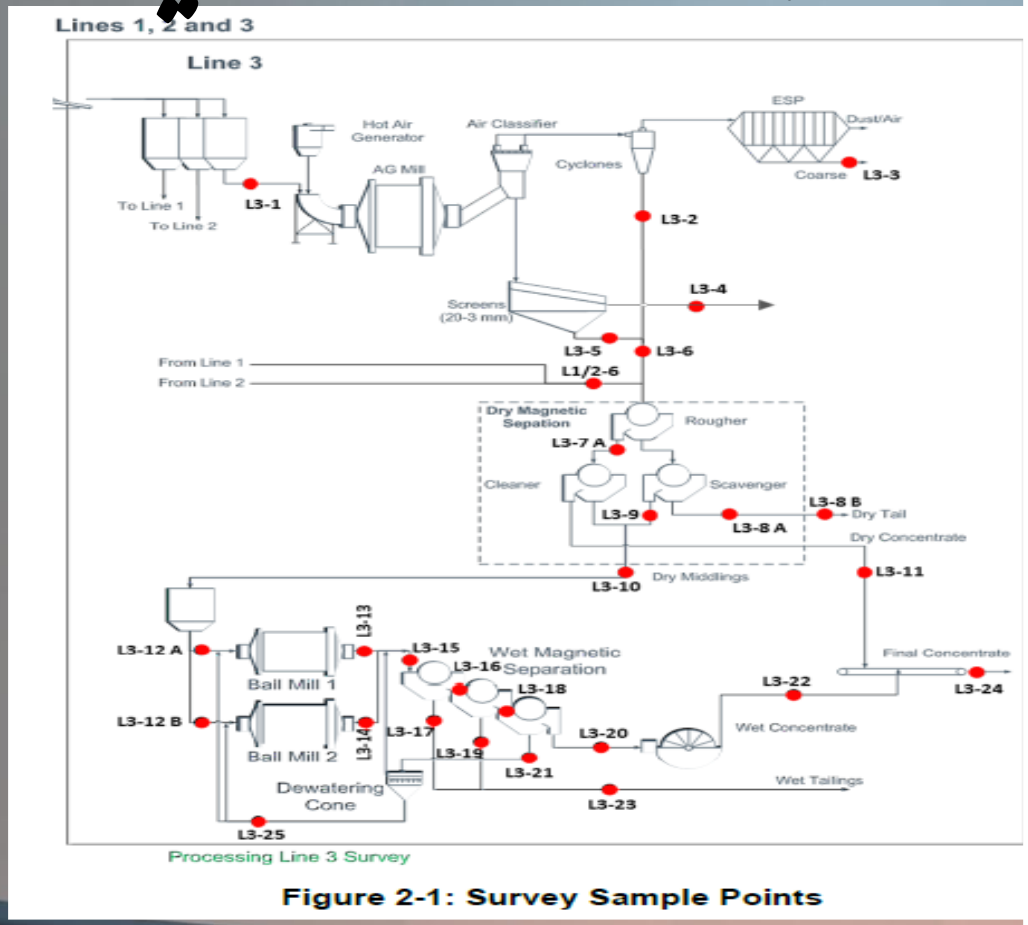

Figure 2-1: Survey Sample Points

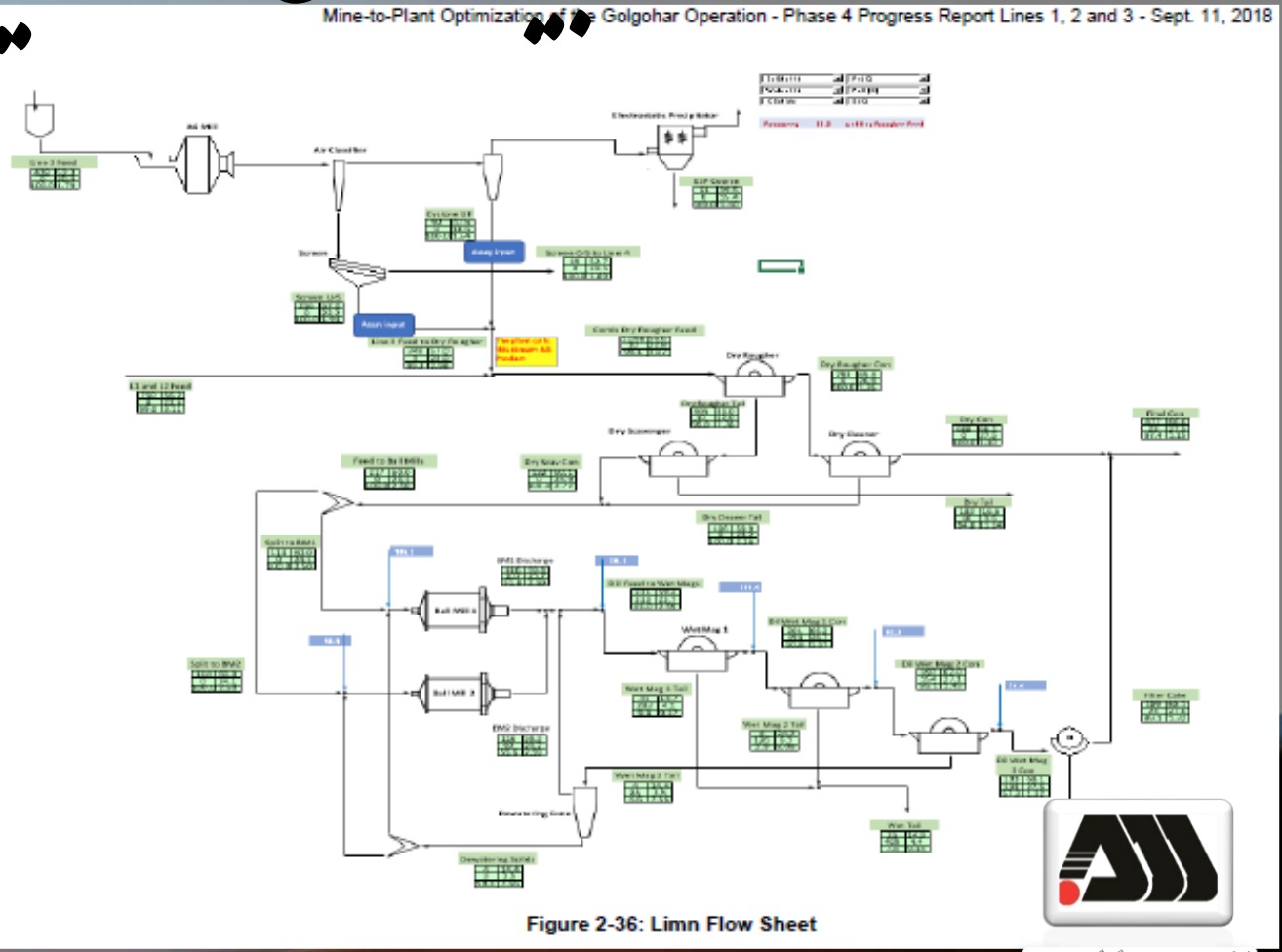

Figure 2-36: Limn Flow Sheet

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