

OECD Steel Committee

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Trends in Investment in the Steel Industry

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Contents

- This presentation covers:
 - An overview of the total market for steel products
 - Capacity for steel products and crude steel
 - The reasons for investment and their impact on steel capacity

Presenter's Background

- James King is an independent consultant, analysing the economic and commercial aspects of the steel and associated raw materials industries since 1982.
- Analysis of the market for steel and raw materials is based on a comprehensive set of data for each of over 100 countries.
- Information and forecasts to 2040 are maintained on capacity of steel plants, production, consumption and trade in finished steel products, crude steel, iron, iron ore and coal, as well as related products such as ferro-alloys.
- Production costs for all of these items are also estimated on a regular basis at the level of individual operations.
- Forecasts of prices are continuously updated.
- A monthly report on the steel market is issued.

Steel Consumption by Product - World

(consumption in million tonnes, average annual change in percent)

<i>Product</i>	<i>1990</i>	<i>1995</i>	<i>2000</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2018</i>	<i>annual growth</i>	
								<i>1990-2018</i>	<i>2000-2018</i>
<u>Flat products</u>	<u>275.6</u>	<u>302.1</u>	<u>370.8</u>	<u>448.6</u>	<u>577.7</u>	<u>637.5</u>	<u>710.5</u>	<u>3.4</u>	<u>3.7</u>
Plate for sale	61.0	50.9	49.7	73.6	106.2	95.6	115.8	1.8	4.5
HR coil for sale	80.4	96.9	116.2	142.1	169.6	207.6	230.1	3.9	3.9
CR coil for sale	73.8	78.3	107.8	120.1	169.3	166.1	180.8	3.3	2.9
Galvanised	44.6	60.0	79.8	97.3	116.0	151.8	166.9	4.8	4.2
Tinplate	15.7	16.0	17.3	15.6	16.6	16.5	17.0	0.2	-0.3
<u>Long products</u>	<u>298.1</u>	<u>299.0</u>	<u>327.2</u>	<u>479.2</u>	<u>655.6</u>	<u>837.0</u>	<u>913.1</u>	<u>3.7</u>	<u>6.5</u>
Railway track	9.3	7.3	6.9	9.2	12.3	11.4	13.2	3.7	3.4
Heavy sections	57.1	47.5	46.5	47.1	45.7	55.8	61.4	-0.1	1.2
Reinforcing bar	85.7	103.2	121.6	190.3	263.7	372.2	399.2	6.0	7.7
Other HR bar	87.4	73.5	66.3	113.2	165.4	189.3	208.5	3.1	7.2
Wire rod	58.6	67.5	85.9	119.4	168.3	208.2	230.7	5.2	6.1
<u>Tubes</u>	<u>69.3</u>	<u>57.2</u>	<u>64.5</u>	<u>90.8</u>	<u>122.4</u>	<u>168.9</u>	<u>163.9</u>	<u>3.6</u>	<u>6.6</u>
Seamless tube	22.9	15.9	17.6	27.1	38.6	42.1	46.3	2.5	6.0
Welded tube	46.4	41.4	46.9	63.7	83.7	126.8	117.5	4.1	6.9
<i>Total finished steel</i>	<i>643.1</i>	<i>658.4</i>	<i>762.5</i>	<i>1018.5</i>	<i>1355.6</i>	<i>1643.4</i>	<i>1787.5</i>	<i>3.7</i>	<i>4.8</i>

Steel Consumption by End-Use - World

(consumption in million tonnes, average annual change in percent)

<i>End-Use</i>	<i>1990</i>	<i>1995</i>	<i>2000</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2018</i>	<i>annual growth</i>	
								<i>1990-2018</i>	<i>2000-2018</i>
Transport, automotive	45.4	51.7	66.4	85.5	116.0	131.1	148.7	4.3	4.6
Transport, other	45.8	45.6	50.9	70.0	96.8	102.1	119.5	3.5	4.9
Oil + gas + water	50.4	42.2	46.1	62.7	81.9	104.2	106.9	2.7	4.8
Engineering	92.1	98.4	120.5	162.0	224.0	272.4	303.5	4.3	5.3
Electrical	26.5	27.8	32.8	43.2	63.2	71.2	79.5	4.0	5.0
Construction	332.4	339.8	383.3	521.6	678.6	836.8	910.7	3.7	4.9
Packaging	18.3	19.2	21.8	21.4	24.6	25.5	27.7	1.5	1.3
Durables	17.0	18.1	22.0	28.3	38.0	42.9	47.5	3.7	4.4
Other	15.2	15.6	18.7	24.1	32.6	57.0	43.5	3.8	4.8
<i>Total finished steel</i>	<i>643.1</i>	<i>658.4</i>	<i>762.5</i>	<i>1018.5</i>	<i>1355.6</i>	<i>1643.4</i>	<i>1787.5</i>	<i>3.7</i>	<i>4.8</i>
share of construction	51.7%	51.6%	50.3%	51.2%	50.1%	50.9%	50.9%		
share of transport	14.2%	14.8%	15.4%	15.3%	15.7%	14.2%	15.0%		

World Steel: Long-Term Trends

- World steel consumption has grown rapidly since 2000, at an average of 4.8%. Over the longer period from 1990 growth was 3.8% per year.
- Flat products (steel plate, sheet and coated sheet such as galvanised) are normally considered to be the more dynamic part of the steel industry, but long products have actually grown more quickly since 2000.
- Consumption of long products grew at 6.5% per year in 2000-2018, compared to 3.7% for flat products (or 4.1% if welded tube, made from flat products, is included).
- In 2018 flat products plus welded tube were 46% of total steel consumption, down from 55% in 2000.
- The construction industry is the largest user of steel products, accounting for about 51% of total consumption.
- The transport sector (automotive and other transport such as railways and ships) accounts for about 15% of total steel consumption. Because of weight reduction in vehicles, the share of the total steel tonnage consumed by the transport industry may not increase in the future.

Steel Consumption by Product - OECD

(consumption in million tonnes, average annual change in percent)

<i>Product</i>	<i>1990</i>	<i>1995</i>	<i>2000</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2018</i>	<i>annual growth</i>	
								<i>1990-2018</i>	<i>2000-2018</i>
<u>Flat products</u>	<u>187.3</u>	<u>211.9</u>	<u>248.5</u>	<u>250.2</u>	<u>231.5</u>	<u>249.7</u>	<u>248.9</u>	<u>1.0</u>	<u>0.0</u>
Plate for sale	31.7	28.8	26.0	33.9	34.0	33.3	31.1	-0.1	0.7
HR coil for sale	56.4	72.8	76.5	70.6	69.0	72.4	72.2	0.9	-0.2
CR coil for sale	48.8	49.8	70.4	66.4	54.2	55.7	57.5	0.6	-0.8
Galvanised	38.6	49.1	63.6	69.7	64.8	79.4	79.8	2.6	0.9
Tinplate	11.8	11.3	12.0	9.7	9.5	8.9	8.3	-1.2	-1.5
<u>Long products</u>	<u>155.4</u>	<u>159.9</u>	<u>169.7</u>	<u>171.3</u>	<u>132.3</u>	<u>155.7</u>	<u>161.4</u>	<u>0.1</u>	<u>-0.2</u>
Railway track	2.5	2.6	3.4	3.3	3.5	4.2	3.4	1.1	0.1
Heavy sections	30.3	27.6	30.1	28.3	22.1	24.4	25.7	-0.6	-0.6
Reinforcing bar	44.6	43.5	51.6	54.8	34.3	51.0	54.8	0.7	0.2
Other HR bar	43.9	47.4	41.4	44.2	35.9	37.6	37.9	-0.5	-0.4
Wire rod	34.1	38.8	43.2	40.7	36.6	38.5	39.6	0.5	-0.3
<u>Tubes</u>	<u>33.4</u>	<u>31.6</u>	<u>36.6</u>	<u>36.7</u>	<u>34.2</u>	<u>38.1</u>	<u>38.0</u>	<u>0.5</u>	<u>0.2</u>
Seamless tube	7.6	6.7	7.6	8.6	8.1	7.8	9.2	0.7	0.8
Welded tube	25.8	24.9	29.1	28.2	26.1	30.3	28.8	0.4	0.0
<i>Total finished steel</i>	<i>376.2</i>	<i>403.4</i>	<i>454.8</i>	<i>458.3</i>	<i>398.1</i>	<i>443.5</i>	<i>448.3</i>	<i>0.6</i>	<i>-0.1</i>
<i>OECD share of world</i>	<i>58.5%</i>	<i>58.5%</i>	<i>59.6%</i>	<i>45.0%</i>	<i>58.5%</i>	<i>58.5%</i>	<i>25.1%</i>		

Steel Consumption by End-Use - OECD

(consumption in million tonnes, average annual change in percent)

<i>End-Use</i>	<i>1990</i>	<i>1995</i>	<i>2000</i>	<i>2005</i>	<i>2010</i>	<i>2015</i>	<i>2018</i>	<i>annual growth</i>	
								<i>1990-2018</i>	<i>2000-2018</i>
Transport, automotive	32.8	38.6	47.1	49.6	46.1	51.9	52.9	1.7	0.6
Transport, other	25.8	28.5	30.8	33.4	32.4	34.5	33.3	0.9	0.4
Oil + gas + water	22.1	22.2	24.7	23.6	21.4	23.8	23.8	0.3	-0.2
Engineering	59.8	66.9	77.2	78.3	71.3	78.3	79.5	1.0	0.2
Electrical	16.4	17.5	20.0	20.2	18.1	19.2	19.3	0.6	-0.2
Construction	185.1	194.0	214.2	214.8	174.3	199.5	203.8	0.3	-0.3
Packaging	13.7	13.7	15.2	13.2	12.5	12.2	11.8	-0.5	-1.4
Durables	11.4	12.6	14.8	15.0	13.4	14.9	15.0	1.0	0.1
Other	9.7	10.6	12.2	12.1	10.9	11.7	12.0	0.8	-0.1
<i>Total finished steel</i>	<i>376.2</i>	<i>403.4</i>	<i>454.8</i>	<i>458.3</i>	<i>398.1</i>	<i>443.5</i>	<i>448.3</i>	<i>0.6</i>	<i>-0.1</i>
share of construction	49.2%	48.1%	47.1%	46.9%	43.8%	45.0%	45.4%		
share of transport	15.6%	16.7%	17.1%	18.1%	19.7%	19.5%	19.2%		

OECD Steel: Long-Term Trends

- In 2018 finished steel consumption in OECD countries was 448m tonnes, almost the same as in 2000.
- OECD countries accounted for 25% of world consumption, down from 60% in 2000. This fall in the share of production is mainly due to the massive increase in consumption in China and India.
- In 2018 flat products plus welded tube were 62% of total steel consumption in the OECD, compared to the world average of 46%.
- The construction industry is the largest user of steel products in the OECD.
- But the construction sector is relatively less important in the OECD (45% of consumption compared to 51% in the world) and the transport sector is relatively more important (19% compared to 15% in the world).

Steel Capacity: Flat Products

(million tonnes)

<i>Product</i>	<i>Item</i>	<i>2017</i>	<i>2018</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>capacity needed ?</i>
Plate - total	Consumption	137.1	149.8	178.7	187.7	197.2	
Plate - total	annual growth to reach 80%			9.2%	1.9%	1.3%	by 2040
Plate - total	Capacity	218.0	220.2	223.4	234.7	246.5	
Plate - total	Capacity utilisation	62.9%	68.0%	80.0%	80.0%	80.0%	
HR coil - total	Consumption	662.1	681.0	831.1	914.2	999.6	
HR coil - total	annual growth to reach 80%			10.5%	2.5%	1.8%	by 2040
HR coil - total	Capacity	944.0	993.4	1038.9	1142.7	1249.4	
HR coil - total	Capacity utilisation	70.1%	68.5%	80.0%	80.0%	80.0%	
CR coil - total	Consumption	350.8	361.3	372.5	393.0	413.1	
CR coil - total	annual growth to reach 80%			1.5%	0.7%	0.6%	by 2030
CR coil - total	Capacity	446.8	460.0	465.6	491.2	516.3	
CR coil - total	Capacity utilisation	78.5%	78.5%	80.0%	80.0%	80.0%	
Galvanised	Consumption	164.3	166.9	168.0	177.0	186.1	
Galvanised	annual growth to reach 80%			0.4%	0.5%	0.5%	by 2020
Galvanised	Capacity	202.9	204.7	210.1	221.3	232.6	
Galvanised	Capacity utilisation	81.0%	81.5%	80.0%	80.0%	80.0%	

Steel Capacity – Finished Steel Products

- The investments of steel companies are for the production of specific finished steel products.
- Crude steel and ironmaking capacity is installed only to make those finished steel products and not to trade in semi-finished steel such as slabs and billets.
- Annual average utilisation of world crude steel capacity has never been above 80% since the 1970's, with a “normal maximum” of 82%.
- The tables show an assessment of the world capacity utilisation for the main finished steel products. It also calculates the annual rate of growth of world consumption from 2018 that would be needed to reach capacity utilisation of 80% for each product. Future capacity is
current capacity +
committed changes +
“capacity creep”: increase of capacity by 0.5% per year through efficiency improvements at existing plants without large investment.
- “Capacity creep” is the main reason for the increase in capacity in the tables because “committed changes” occur only in the early years while capacity creep is cumulative over many years.

Steel Capacity: Long Products

(million tonnes)

<i>Product</i>	<i>Item</i>	<i>2017</i>	<i>2018</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>capacity needed ?</i>
Heavy sections + rail	Consumption	70.0	74.6	126.2	132.7	139.5	
Heavy sections + rail	annual growth to reach 80%			30.1%	4.9%	2.9%	no
Heavy sections + rail	Capacity	154.4	155.9	157.8	165.9	174.3	
Heavy sections + rail	Capacity utilisation	45.3%	47.8%	80.0%	80.0%	80.0%	
Bar	Consumption	562.7	607.8	622.6	654.5	687.9	
Bar	annual growth to reach 80%			1.2%	0.6%	0.6%	by 2020
Bar	Capacity	758.3	766.2	778.3	818.1	859.9	
Bar	Capacity utilisation	74.2%	79.3%	80.0%	80.0%	80.0%	
Wire rod	Consumption	207.0	230.7	254.7	267.7	281.4	
Wire rod	annual growth to reach 80%			5.1%	1.2%	0.9%	by 2030
Wire rod	Capacity	312.4	314.1	318.4	334.7	351.8	
Wire rod	Capacity utilisation	66.3%	73.5%	80.0%	80.0%	80.0%	

Steel Capacity – Finished Steel Products

- In **flat products** capacity utilisation for plate and hot-rolled coil hot is below 70%. For plate consumption would have to grow at 1.9% per year from 2018 to give capacity utilisation of 80% by 2030. That growth is not likely, so no additional capacity is required by 2030, but it may be required by 2040
- For HR coil some new capacity is needed by 2040.
- More HR coil will be cold rolled and more CR coil will be coated, so capacity expansions will be needed in cold rolling and coating .
- In **long products**, capacity utilisation is very low in heavy sections. Consumption would have to grow at 2.9% per year from 2018 to give capacity utilisation of 80% in 2040. That growth is not likely, so no additional capacity is required. By 2040.
- New capacity will be required most urgently in steel bars, driven by the construction of housing and infrastructure in developing countries.
- In **tubes** new capacity has been added in seamless tubes for the oil and gas industry in recent years. New capacity will be required by 2040, but not before.
- Utilisation of capacity for welded tubes is very low and new capacity will not be required until 2040.

Steel Capacity: Tubes

(million tonnes)

<i>Product</i>	<i>Item</i>	<i>2017</i>	<i>2018</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>capacity needed ?</i>
Seamless tube	Consumption	42.0	46.3	57.2	60.1	63.2	
Seamless tube	annual growth to reach 80%			11.1%	2.2%	1.4%	by 2040
Seamless tube	Capacity	69.3	70.2	71.5	75.1	79.0	
Seamless tube	Capacity utilisation	60.6%	66.1%	80.0%	80.0%	80.0%	
Welded tube	Consumption	111.2	117.5	149.5	157.2	165.3	
Welded tube	annual growth to reach 80%			12.8%	2.5%	1.6%	by 2040
Welded tube	Capacity	184.7	185.0	186.9	196.5	206.7	
Welded tube	Capacity utilisation	60.2%	63.5%	80.0%	80.0%	80.0%	

Steel Capacity – Crude Steel

- Capacity utilisation for total crude steel in 2018 was about 73%. For BOF steel it was over 80%, but lower for EAF steel.
- The requirements for additional capacity in finished steel products will favour the electric steel process (for bars and wire rod) over the integrated (BOF) steel process (for plate, HR coil and sections),
- This, combined with slow growth of steel consumption in China and a shift towards electric steel for environmental reasons in China and other countries, means that electric steel is likely to show growth which BOF steel and blast furnace iron show no growth or a decline.
- Consumption of electric steel would need to grow by 3.4% per year to 2030 to reach 80% utilisation of capacity. This is possible, so new capacity may be needed by 2030.
- If total consumption of crude steel does not grow by more than 1.4% per year, no net additions to crude steel capacity will be needed by 2040.

Steel Capacity – Crude Steel

(million tonnes)

<i>Product</i>	<i>Item</i>	<i>2017</i>	<i>2018</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>capacity needed ?</i>
BOF steel	Consumption	1246.9	1290.0	1301.2	1436.6	1586.2	
BOF steel	annual growth to reach 80%			0.4%	0.9%	0.9%	no
BOF steel	Capacity	1563.9	1581.6	1626.5	1795.8	1982.8	
BOF steel	Capacity utilisation	79.7%	81.6%	80.0%	80.0%	80.0%	
EAF Steel	Consumption	487.9	521.8	706.6	782.4	864.2	
EAF Steel	annual growth to reach 80%			16.4%	3.4%	2.3%	by 2030
EAF Steel	Capacity	838.0	855.2	883.3	978.0	1080.3	
EAF Steel	Capacity utilisation	58.2%	61.0%	80.0%	80.0%	80.0%	
Total crude steel	Consumption	1742.5	1814.8	2034.3	2242.9	2472.1	
Total crude steel	annual growth to reach 80%			5.9%	1.8%	1.4%	
Total crude steel	Capacity	2435.9	2470.5	2542.9	2803.6	3090.1	
Total crude steel	Capacity utilisation	71.5%	73.5%	80.0%	80.0%	80.0%	

Reasons for Investment

- Steel producers make investments in capacity for finished steel, and hence for crude steel and iron, for various reasons. Only some of these are intended to increase total capacity, but most of them actually do increase capacity. They include:
 - Growth in consumption in the markets they can serve, e.g. an increase in national construction raises the consumption of bars and a steel plant is able to expand bar capacity and associated steelmaking. Result: an increase in world capacity and world consumption.
 - Import substitution by market growth, e.g. the national consumption of galvanised steel reaches a size that can support a domestic plant to replace imports. Result: an increase in world capacity with no change to world consumption.
 - Import substitution by trade policy, e.g. higher tariffs are considered sufficiently permanent to permit a steel producer to add domestic capacity to replace imports priced out by the tariffs. Result: an increase in world capacity with no change to world consumption.
 - Customer requirements, e.g. car companies request stronger steel sheet to reduce the weight of vehicles. This may require new hot- and cold rolling capacity and additional equipment for steelmaking. Result: an increase in world capacity, while world consumption may be reduced in tonnage because of thinner sheet.
 - Competitive product opportunity, e.g. a producer of seamless tubes sees an opportunity to take market share from competitors by having better products for the oil and gas industry because of new technology. Result: an Increase in world capacity with no change to world consumption.

Reasons for Investment

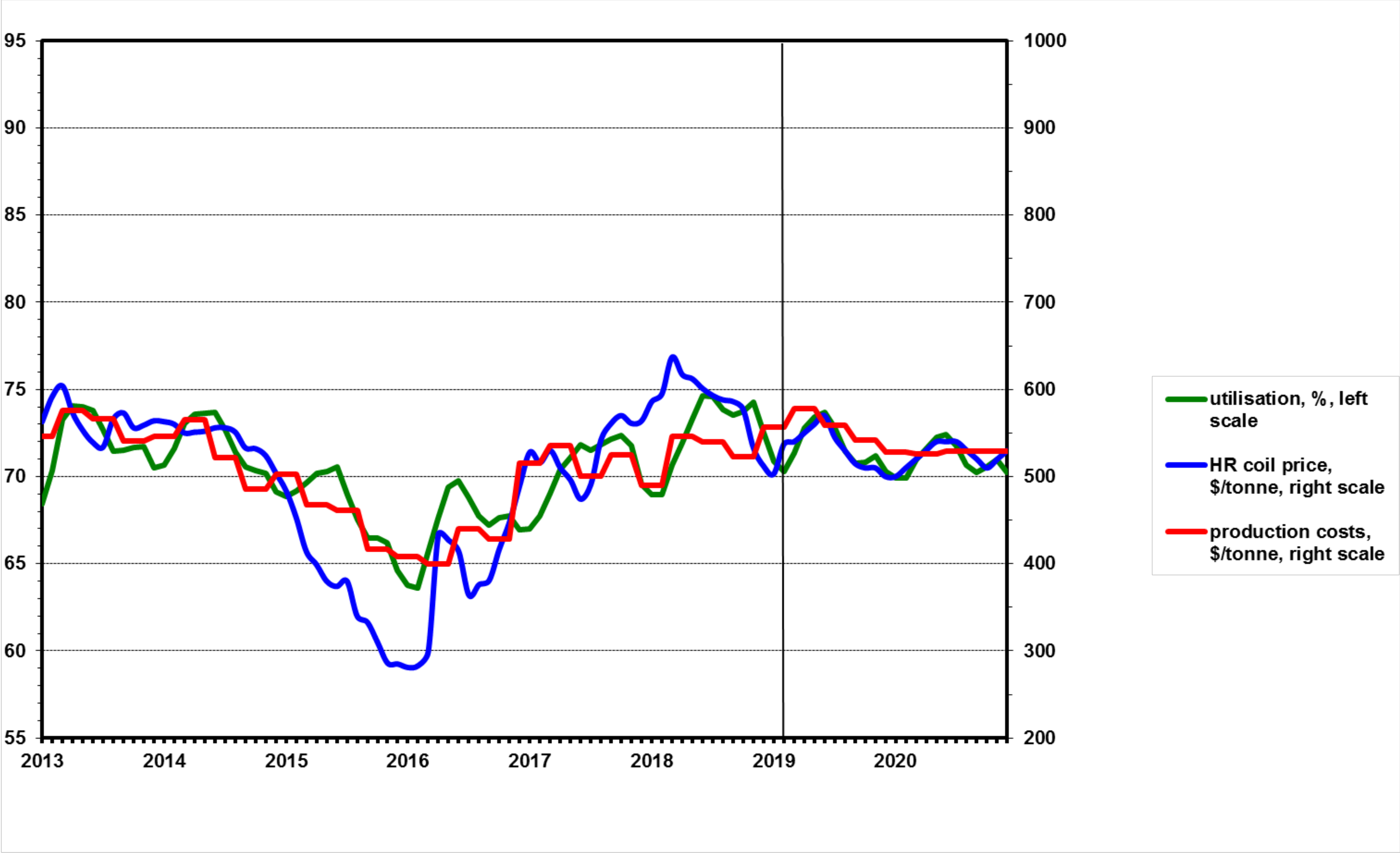
- Competitive geographical opportunity, e.g. a producer of reinforcing bars builds a new plant to fill a gap in regional supply, displacing products from more distant competitors with higher transport costs. Result: an Increase world capacity with no change to world consumption.
- Search for higher margins, e.g. a producer sees higher profit margins in better qualities of wire rod and adds improved steelmaking and rolling equipment. Result: an increase in world capacity with no increase to world consumption.
- Response to competitive threat from quality e.g. producers in China or Russia fear that they will not be able to compete in the western market unless they improve the quality of their products, so they invest in new steelmaking and rolling equipment. Result: an increase in world capacity with no increase in world consumption.
- Response to competitive threat from costs, e.g. producers in Europe install new equipment or processes to reduce their energy and labour costs to compete against imports. Result: an increase in capacity as new equipment produces more than the old equipment that is closed..
- National economic development policy, e.g. a large steel plant is built with state assistance in a developing country, with capacity much larger than the domestic market, in anticipation of future growth. Result: an increase in world capacity without an equivalent increase in world consumption.
- National environmental policy, e.g. steelmakers are required to change processes to reduce emissions, adding capacity for new processes and closing old process. Result: an Increase in world capacity for some processes and a reduction for others, possibly with more production from the new equipment than the old, with no change to world consumption

Timing of Investment

- For the individual producer the decision to make any of these investments is a commercial decision, based on an assessment of the additional profits that can be obtained from it (or the prevention of losses that might otherwise occur). Many of those decisions do not depend on the prospect of additional consumption of steel products
- There will be a continuing large flow of investment of all the types in the list above, with the emphasis on environmental improvement, quality improvement, cost reduction, automation and computerisation. Very little of this will have a stated objective of increasing capacity.
- There is a tendency in these investments to increase capacity more than consumption. To avoid permanent excess capacity, there must therefore be an equal reduction in capacity at other plants. This happens very slowly because of a reluctance to close plants and reduce employment.
- The timing of the investments will be strongly influenced by the current and expected level of steel prices, i.e. whether steel prices are high or low in relation to “normal”.
- The chart shows that for a benchmark product such as hot-rolled coil, producers were profitable in 2018 (blue line above red line), but that has now turned into a loss-making situation (blue line below red line).
- The table shows current prices in relation to “normal” prices.

Steel Utilisation, Costs and Prices

(utilisation in percent, prices and costs in US\$ per tonne)



Steel Prices

(US\$ per tonne)

<i>Product</i>	<i>Average 2018</i>	<i>February 2019</i>	<i>Average 2019</i>	<i>Average 2020</i>	<i>"Normal"</i>	<i>Current to Normal</i>
<i>Plate</i>	685	632	626	622	602	4.9%
<i>HR coil</i>	586	537	531	524	542	-0.8%
<i>CR coil</i>	711	600	642	655	615	-2.5%
<i>Galvanised Sections</i>	771	677	715	735	793	-14.6%
<i>Rebar</i>	736	703	697	668	635	10.8%
<i>Wire rod</i>	532	495	502	493	534	-7.3%
	595	520	555	543	568	-8.5%
<i>Scrap</i>	307	280	281	261	275	1.7%
<i>spread: scrap to rebar</i>	225	216	221	232	259	-16.8%

- “Normal” prices are an average of historical prices in real terms, the current total costs of production and the costs of production at new capacity, including a normal return on capital.
- Steel prices for most products are now below “normal”, but were above normal during 2018. These below normal prices will slow the commitment of new investment in 2019 and 2020.

OECD Steel Committee

25 March 2019

Thank you for your invitation

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