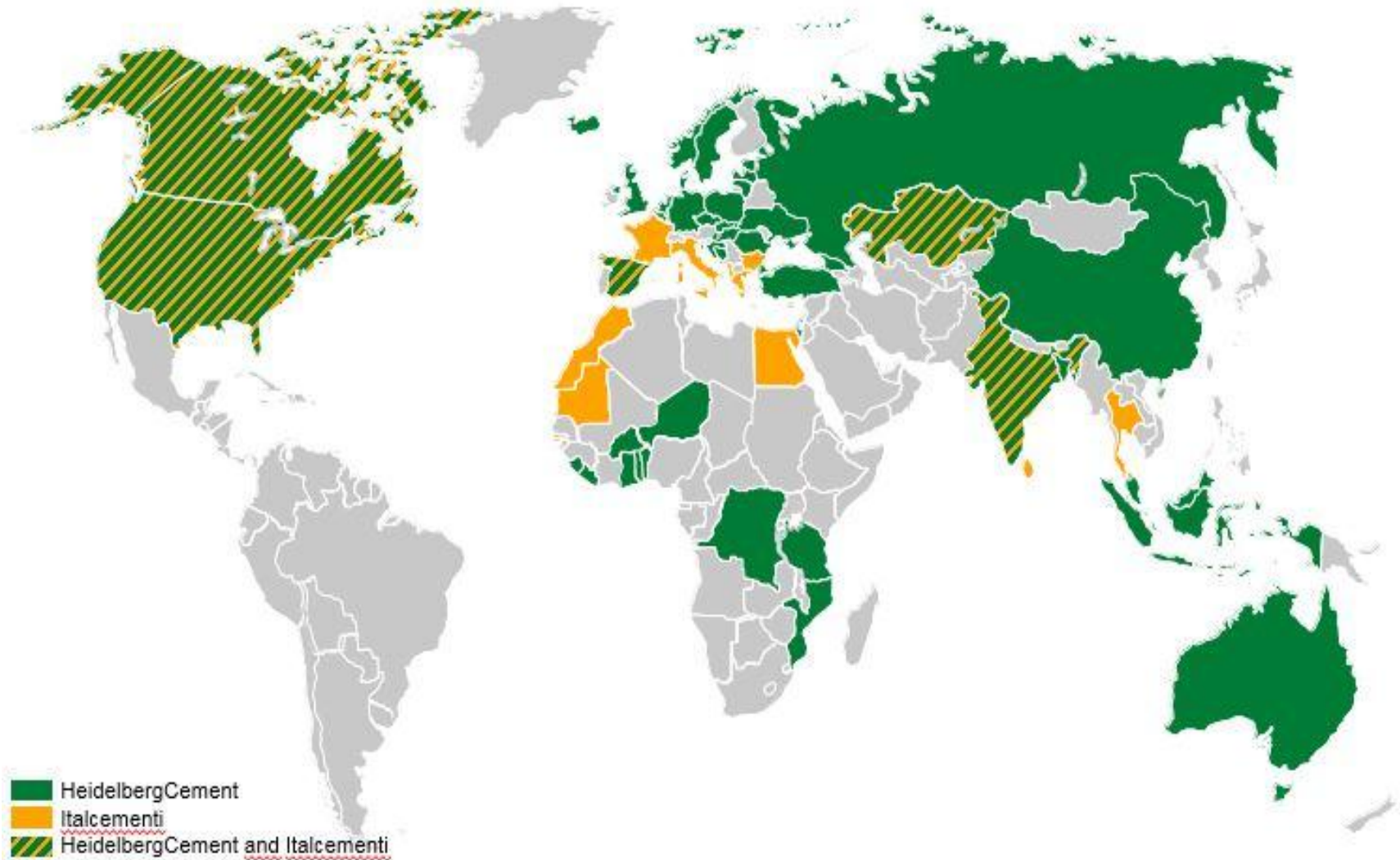


HeidelbergCement India Ltd.

Welcome To Threshold Value of Minerals Workshop



World wide Presence of Heidelberg and Zuari Cement



HCIL Limestone Mines of Damoh: At a glance



Mines Area &
Around

Green Belt

Bougainvillea at Slope

Mines during monsoon

East Pit- Water REservoir

Colouring Mines with colourful flower

Mining Industries at a Glance

Metals and Mining

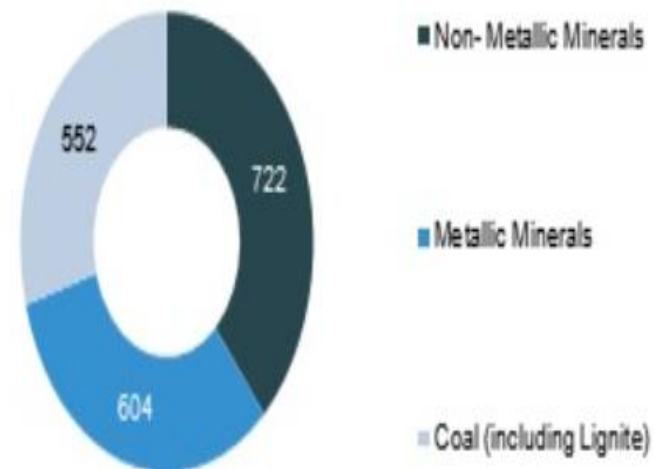
Latest update: September, 2017

- In 2016, India stood as the 3rd largest crude steel producer in the world, while the total crude steel production was 88 MT
- India accounted for 5.89 per cent of the total steel production in the world in the year 2016
- India is 3rd largest producer of crude steel in the Asia-Pacific region in 2015. Total finished steel production (alloy+ non-alloy) in India reached 83.01 million tonnes in FY171
- In FY16E, offshore region accounted for 20.20 per cent share in India's share of states in value of mineral production.

Notes: MMT- Million Metric Tonnes, E-Estimated, 1Data from April 2016 – Jan 2017

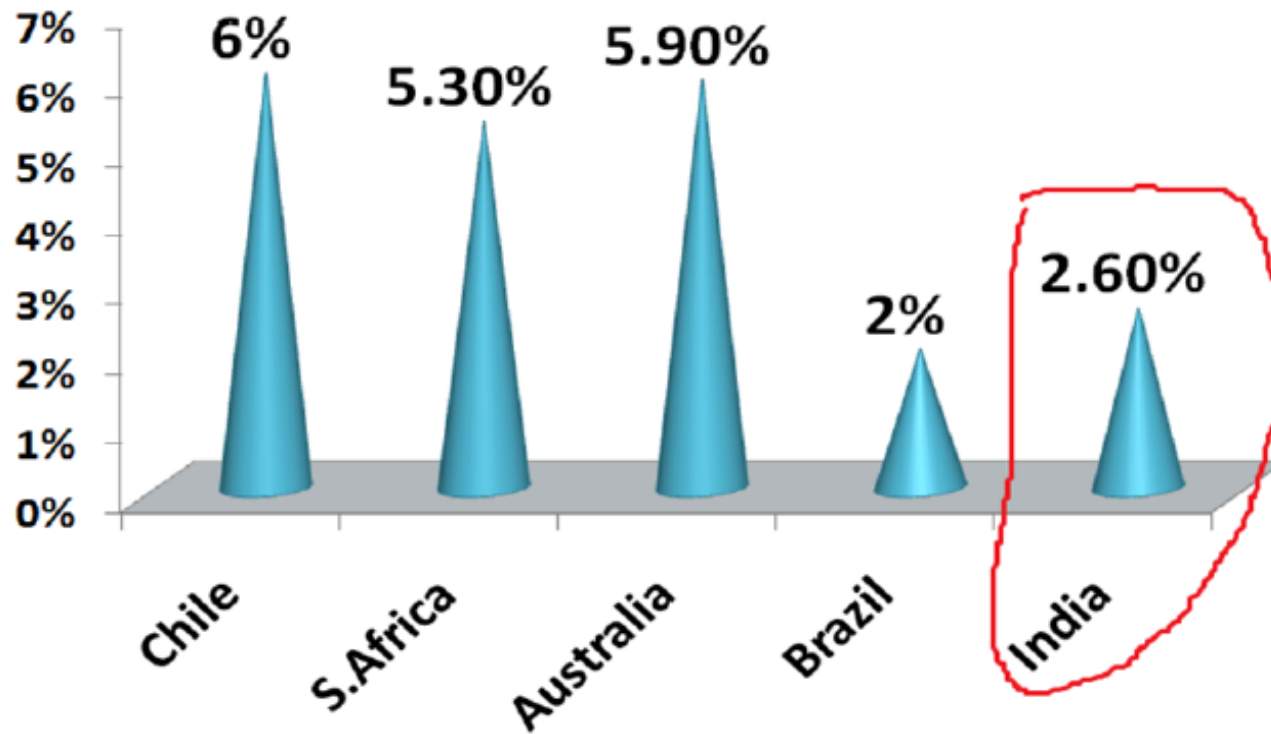
Source: DataMonitor, Ministry of Mines

Share in India's mining sector (in terms of Reporting Mines, FY16E)



Source: DataMonitor, Ministry of Mines

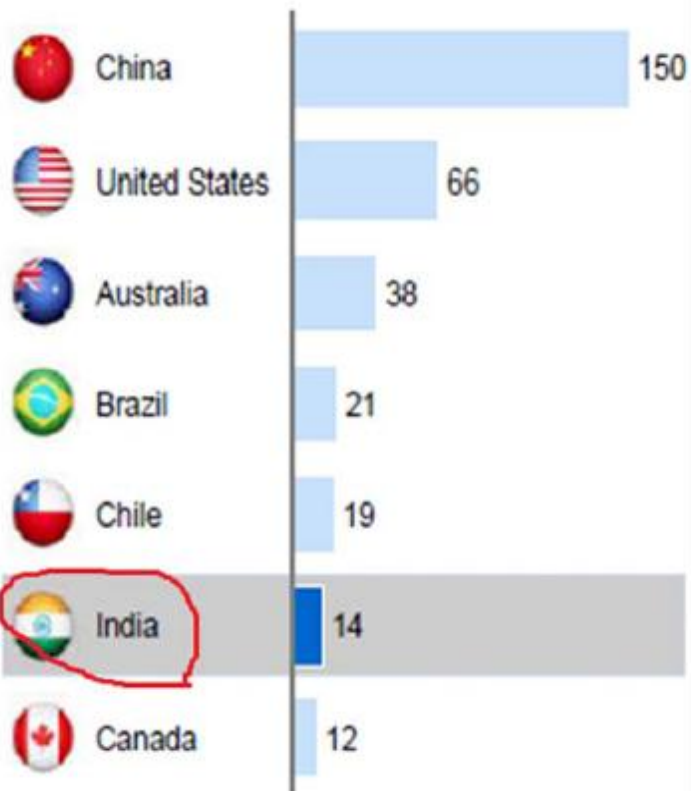
Global Comparison -the mining sector's contribution to the GDP



Source: Strategy Paper, Govt of India (2011)

Size and growth of India's mining sector vs other mining economies

Mining sector¹ value add, 2012
Real USD billion (base year 2005)

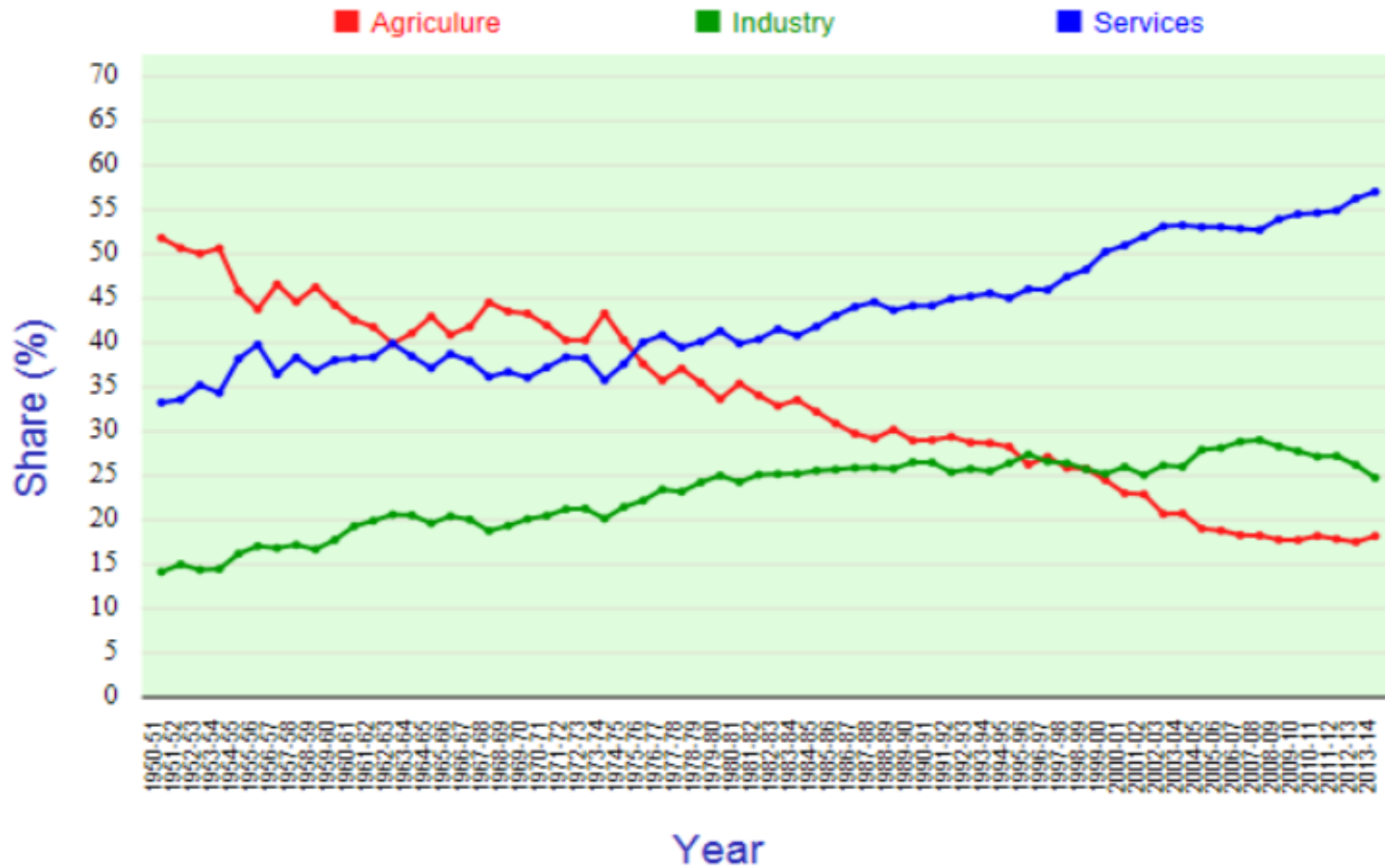


Growth of mining sector¹ value add 2010–2012
CAGR, per cent



Sources HIS Economics, 2014

Sectorwise contribution of GDP of India (1950-2014)



Sector Wise Contribution

Sector		GVA (Rupees in Crore) at current prices						% share
		2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	
1	Agriculture Sector	1,501,816	1,680,798	1,932,692	2,067,935	2,172,910	2,382,289	17.32 %
1.1	Agriculture, forestry & fishing	1,501,816	1,680,798	1,932,692	2,067,935	2,172,910	2,382,289	17.32 %
2	Industry Sector	2,635,052	2,921,262	3,188,270	3,455,221	3,683,358	3,989,791	29.02 %
2.1	Mining & quarrying	261,035	285,776	295,716	313,844	296,041	309,178	2.25 %
2.2	Manufacturing	1,409,986	1,572,830	1,713,445	1,883,929	2,065,093	2,278,149	16.57 %
2.3	Electricity, gas, water supply & other utility services	186,668	215,164	259,840	279,456	321,765	338,396	2.46 %
2.4	Construction	777,363	847,492	919,269	977,992	1,000,459	1,064,068	7.74 %
3	Services Sector	3,969,789	4,603,255	5,245,305	5,947,260	6,595,670	7,378,705	53.66 %
3.1	Trade, hotels, transport, communication and services related to broadcasting	1,413,116	1,664,083	1,874,443	2,095,337	2,294,367	2,538,162	18.46 %
3.2	Financial, real estate & prof servs	1,530,691	1,776,023	2,069,386	2,363,328	2,632,432	2,896,300	21.06 %
3.3	Public Administration, defence and other services	1,025,982	1,163,149	1,301,476	1,488,595	1,668,871	1,944,243	14.14 %
GVA at basic prices		8,106,656	9,205,315	10,366,266	11,470,415	12,451,938	13,750,786	100.00 %

India's exploration spend and landscape as compared to global mining economies

Exploration budget per square km area, 2013
USD/km²

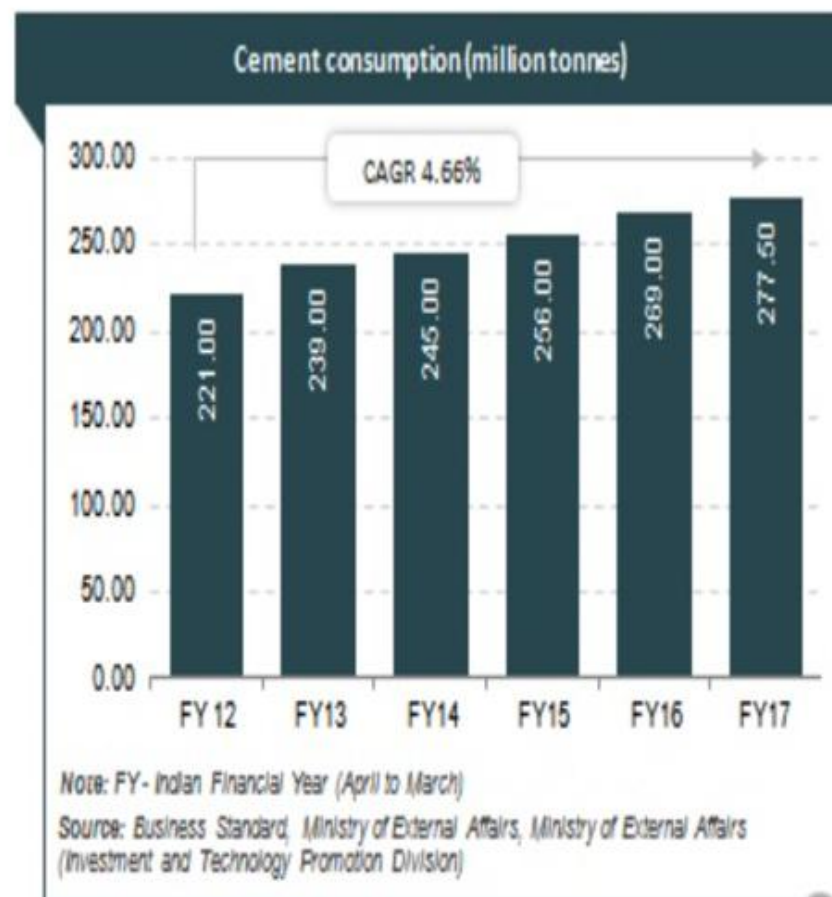


Cement Industry – Capacity, Production and Growth

Latest update: October, 2017

- Second largest cement market
- With cement production capacity of nearly 420 million tonnes, as of July 2017.
- India's cement production capacity is expected to reach 550 million tonnes by 2025.
- India is the second largest cement producer in the world.

Source: Business Standard, Ministry of External Affairs, Ministry of External Affairs (Investment and Technology Promotion Division)



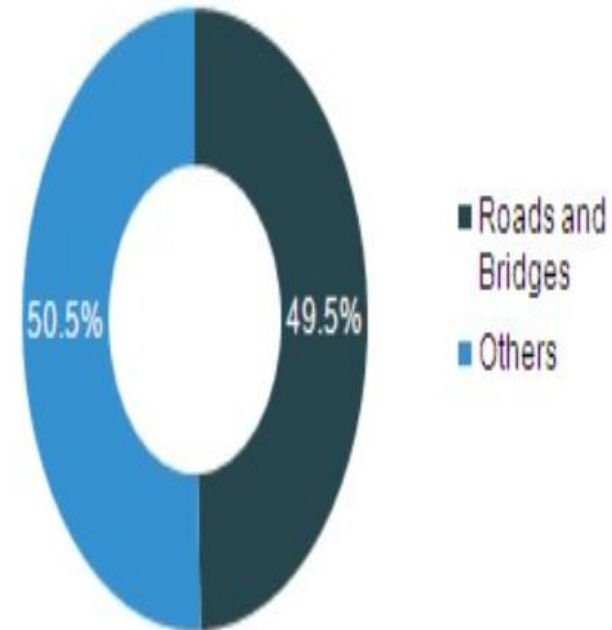
Road and Infrastructure Industry Analysis

Latest update: September, 2017

- As of 15th May, 2017, there were 1,582 PPP projects in India, of which 783 were related to roads & bridges accounting for a value of USD74.63 billion
- Project awarded under BOT is 7.15 per cent of the total awarded projects as of May 2017

Source: MoRTH

Total PPP Projects in India (May 2017)



Source: MoRTH

■ Indian Thermal Coal Classification

Grade	Useful Heat Value (UHV) (Kcal/ Kg) UHV= 8900- 138(A+M)	Corresponding Ash% + Moisture % at (60% RH & 40°C)	Gross Calorific Value GCV (Kcal/ Kg) (at 5% moisture level)
A	> 6200	<19.5	> 6454
B	5600–6200	19.6–23.8	6049–6454
C	4940–5600	23.9–28.6	5597–6049
D	4200–4940	28.7–34.0	5089–5597
E	3360–4200	34.1–40.0	4324–508
F	2400–3360	40.1–47.0	3865–4324
G	1300–2400	47.1–55.0	3113–3865

Source: MOC 2014d.

Normative requirement of coal for manufacturing of Cement Clinker

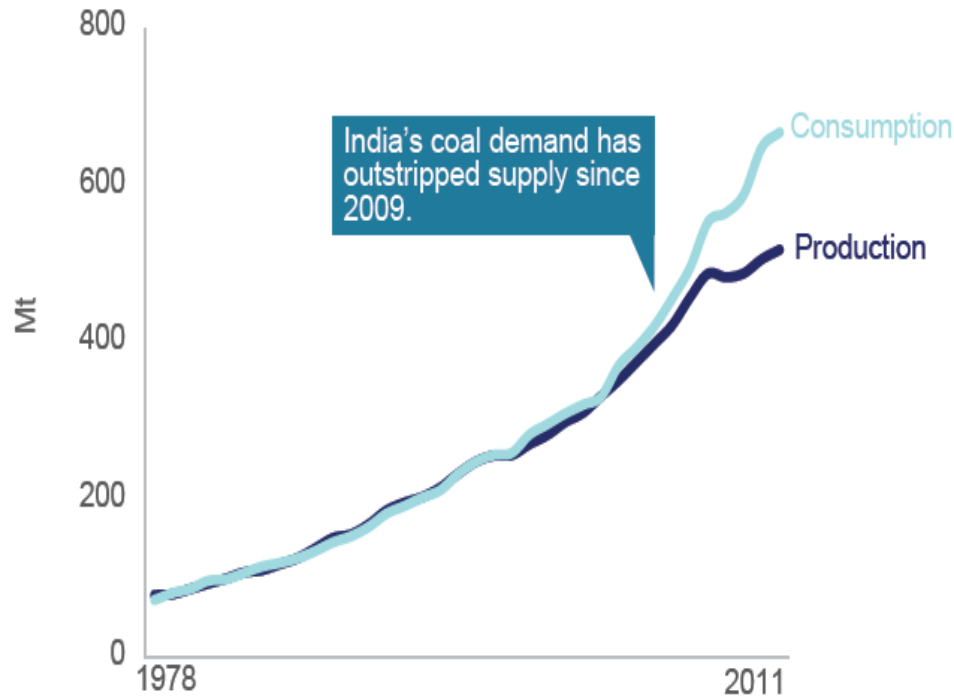
	Process		
	Wet	Semi- dry	Dry
Coal Grades	kg/ ton of clinker		
G-1	185	129	111
G-2	193	135	116
G-3	202	141	121
G-4	212	148	127
G-5	223	156	134
G-6	235	164	141
G-7	248	173	149
G-8	262	183	157
G-9	279	195	167
G-10	298	208	179
G-11	319	223	192
G-12	344	240	207
G-13	373	261	224
G-14	408	285	245

Requirement of Coal for Cement Industry (IS12770 : 1989)

Sl. No.	Characteristics	Requirement
i)	Total Moisture content, (at 60 percent RH and 40°C) percent by mass	Max. 8
ii)	Volatile matter, (air dry basis) percent by mass	Min.24
iii)	Ash, percent by mass	
	a)dry Process	Max. 27
	b)Wet process	Max.24
iv)	Sulphur, percent by mass	Max.0.8
v)	Chloride, percent by mass	Max.0.01
vi)	Size, mm	Max.250

India Coal Demand and Supply

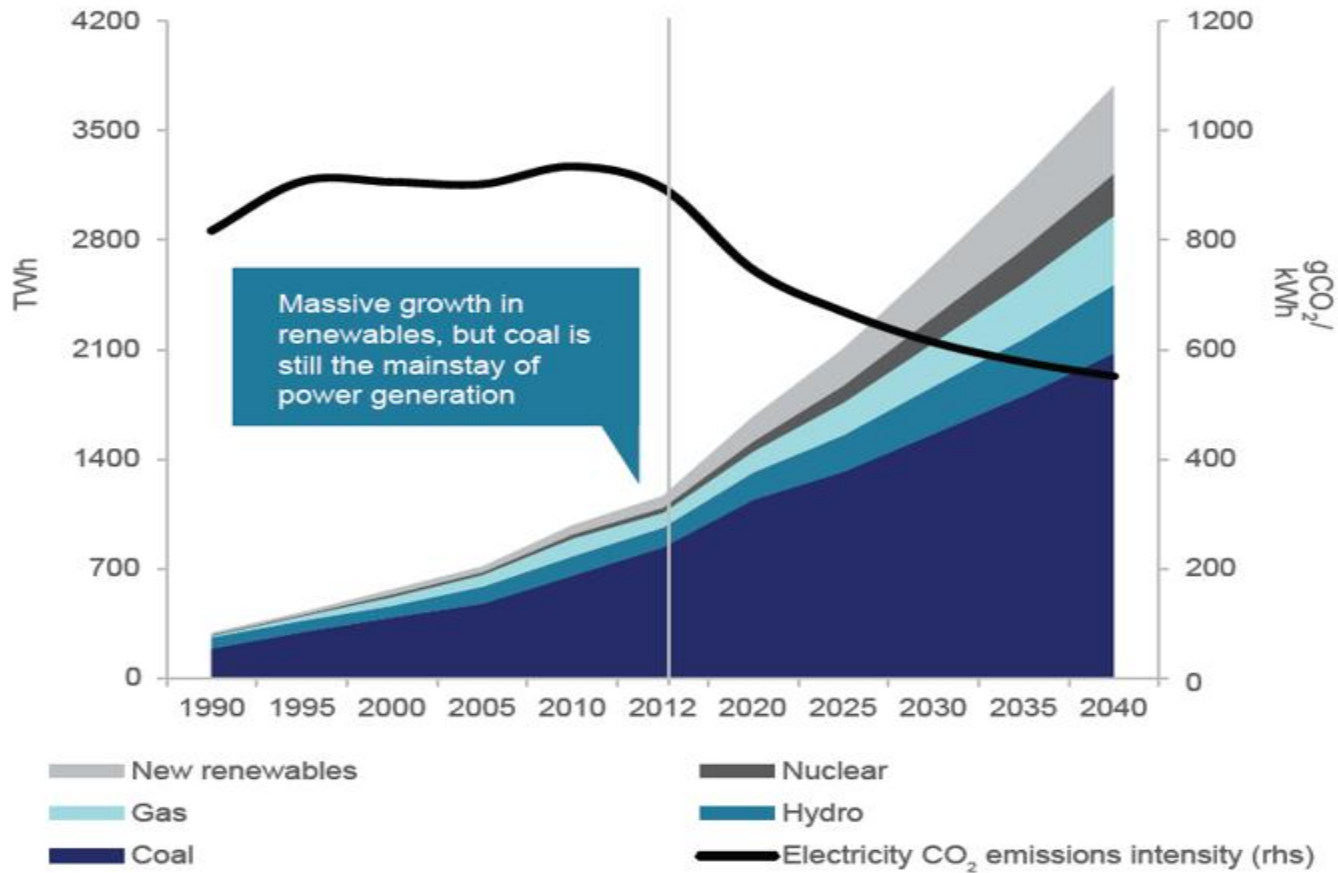
Source: IEA 2014d, World Bank 2015



Despite large reserves, production growth has been well below growth in consumption over the past decade.

Source: IEA 2014f

Indian's Electricity Generation by source and CO2 Intensity, New Policies scenario



Sources: IEA 2014d; IEA 2014g; IEA 2014a.

Threshold Value

- ❑ The threshold value is a component to mineral conservation as it decides the lower limit of sub grade in a mineral deposit and upper limit of mining waste as distinct from utilizable/ marketable fraction of ore zone.
- ❑ Last threshold value was revised by Indian Bureau of Mines in the year 2009 based on beneficiability/ marketability of minerals.

Threshold values for Limestone were defined as under:

States	Threshold Values
Chhattisgarh, Gujarat, Himachal Pradesh, Madhya Pradesh, Maharashtra Rajasthan, Uttarakhand & Uttar Pradesh :	CaO – 34% (Min), MgO- 4% (Max)
Andhra Pradesh, Jharkhand Karnataka, Kerala, Orissa & Tamilnadu	CaO-35% (Min), MgO- 4% (Max), SiO ₂ – 18% (Max) & Alkalies-0.5%(Max)

LIMESTONE RESERVE IN INDIA AS ON 01.04. 2010

(In 'Mio tonnes)

S.No.	Grade of LS	Reserve	Resource	Total	% wise	G Total	% CaO
1	Chemical	236.522	5079.652	5316.174	2.66		
2	SMS (OH)	1015.135	5013.527	6028.662	3.02	11.48	48 - 55
3	SMS (LD)	100.409	297.388	397.797	0.20		
4	SMS (Mixed) (OH + LD)	22.842	192.628	215.47	0.11		
5	BF	930.747	13701.174	14631.92	7.32		
6	SMS & BF	219.48	1450.342	1669.822	0.84		
7	Cement (Portland)	11215.887	124904.122	136120	68.11		
8	Cement (White)	2.263	130.302	132.565	0.07		
9	Cement (Mixed) (Portland+White)	86.458	1062.291	1148.749	0.57		
10	Cement (Blendable/beneficial)	315.29	911.208	1226.498	0.61		
11	BF & Cement Mixed	53.753	163.809	217.562	0.11		
12	SMS, Chemical and Paper	1.331	1233.446	1234.777	0.62	16.39	Different Grade
13	Paper	28.791	925.755	954.546	0.48		
14	Others	106.582	3967.899	4074.481	2.04		
15	Un classified	180.044	24417.733	24597.78	12.31		
16	Not known	410.857	1483.836	1894.693	0.95		
	TOTAL	14926.391	184935.112	199861.5	100.00		

Limestone Deposits

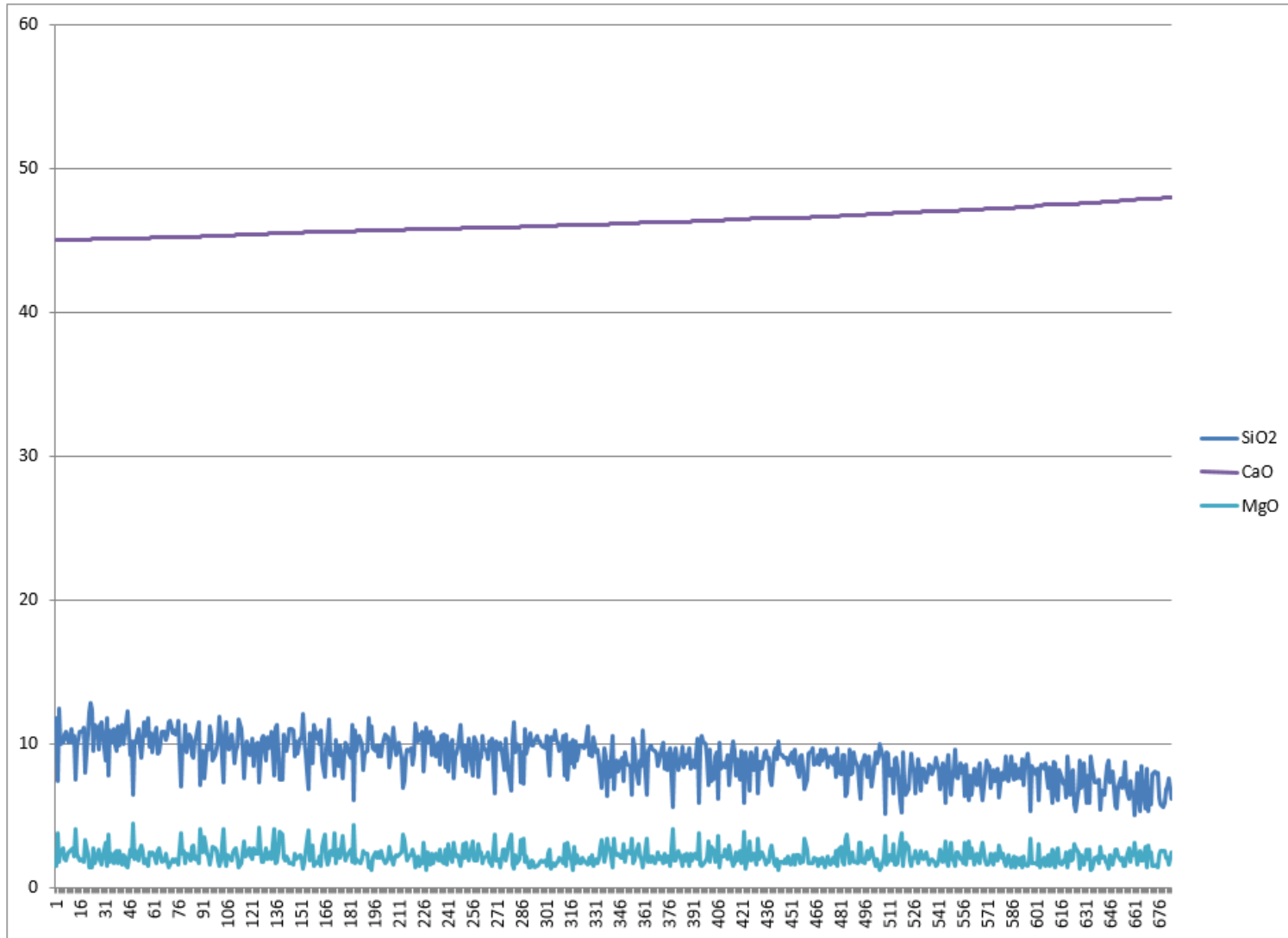
- ❑ Most of the Limestone deposits available for Cement Industry are of marginal Grade and about 69% of total limestone available in India so far. The remaining other available deposits suitable for steel, chemical and other industries amounts to 11.48, 2.66 and 16% respectively.
- ❑ The Limestone deposits containing 34 - 39% of CaO have high Silica or MgO. This quantity of limestone can be consumed only after blending with high grade limestone. But the quantity of available high grade limestone is limited to approx 11 – 13% for all purposes.
- ❑ Cement Industry is the main consumer of limestone and using about 97% of total Limestone production and other Industries are using only 3%.

Considerations for Revision of Threshold Value of Limestone

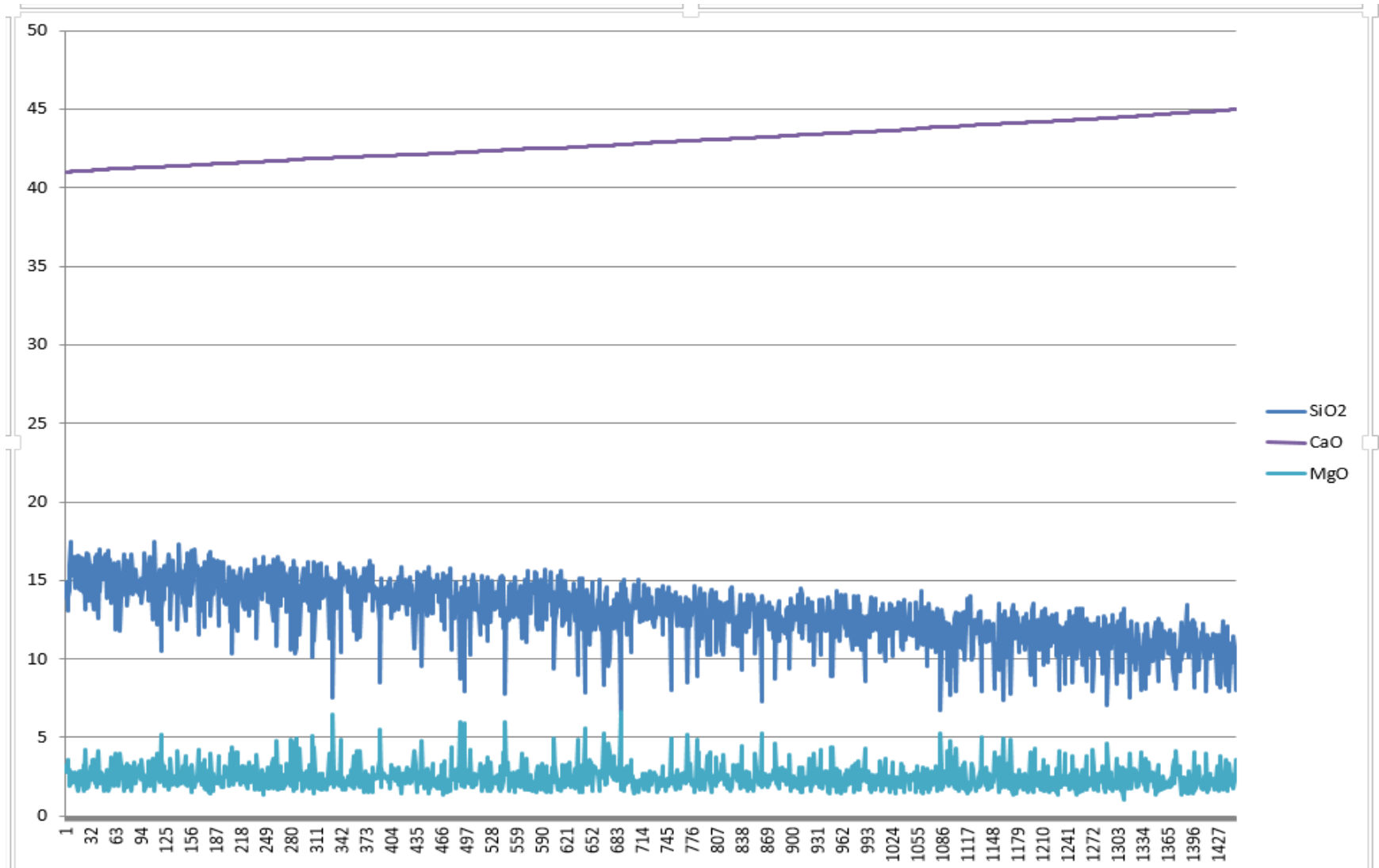
National Council for Cement and Building Materials (NCCBM) norms for prospecting limestone suggest limiting value of CaO to be minimum 40%.

Oxide Component	Acceptable range for manufacture of OPC	Limiting values taking into consideration other type of cement, scope of beneficiation and blending
CaO	44 -52	40 (Min)
MgO	3.5 (Max)	5.0 (Max)
SiO ₂ , Al ₂ O ₃ & Fe ₂ O ₃	To satisfy Lime Saturation Factor (LSF), Silica Modulus and Alumina Modulus	
Na ₂ O + K ₂ O	<0.60	<1.0
Total S as SO ₃	<0.60	<0.80
Cl	<0.015	<0.05

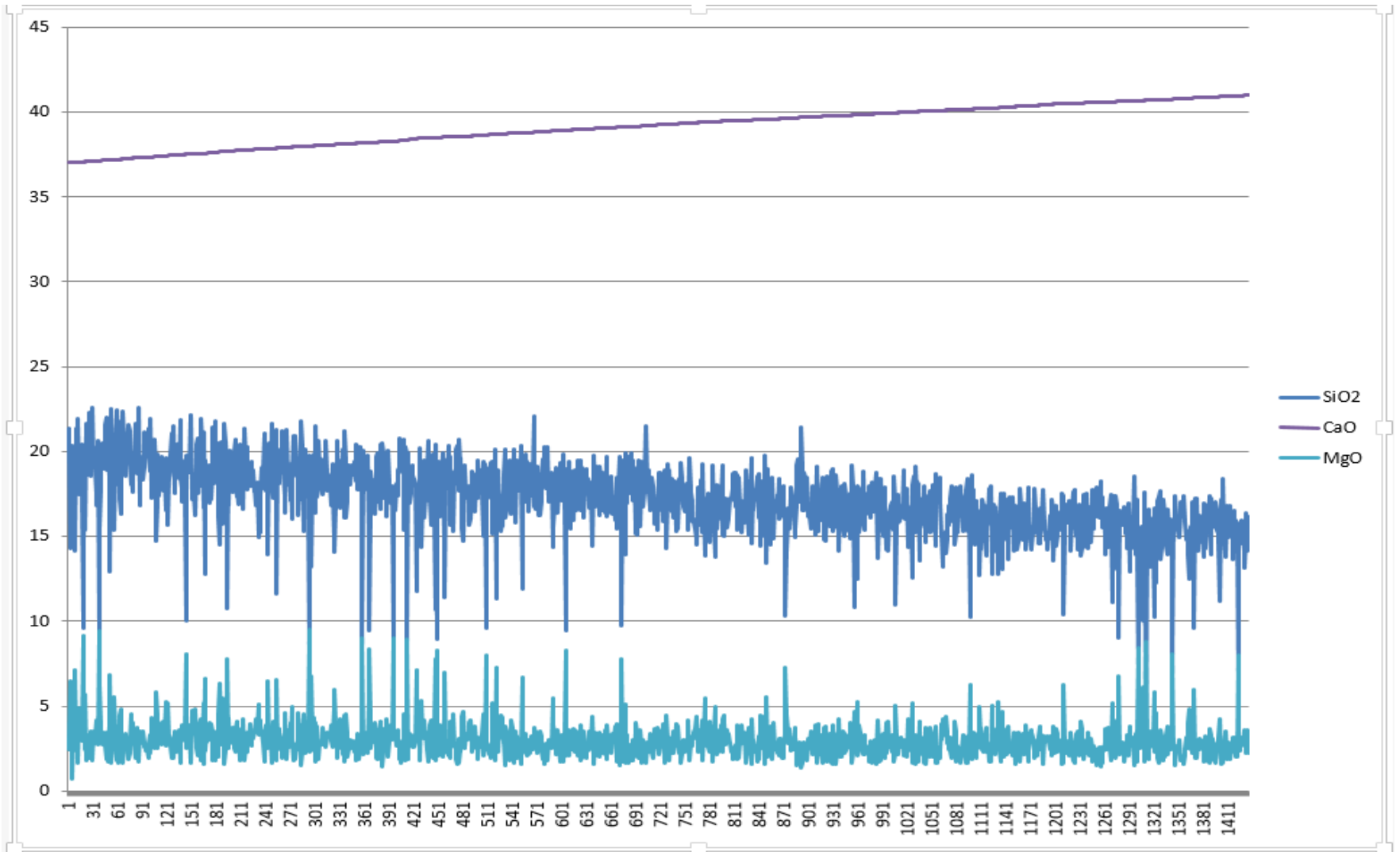
CaO vs SiO₂ & MgO (CaO 45 – 48%)



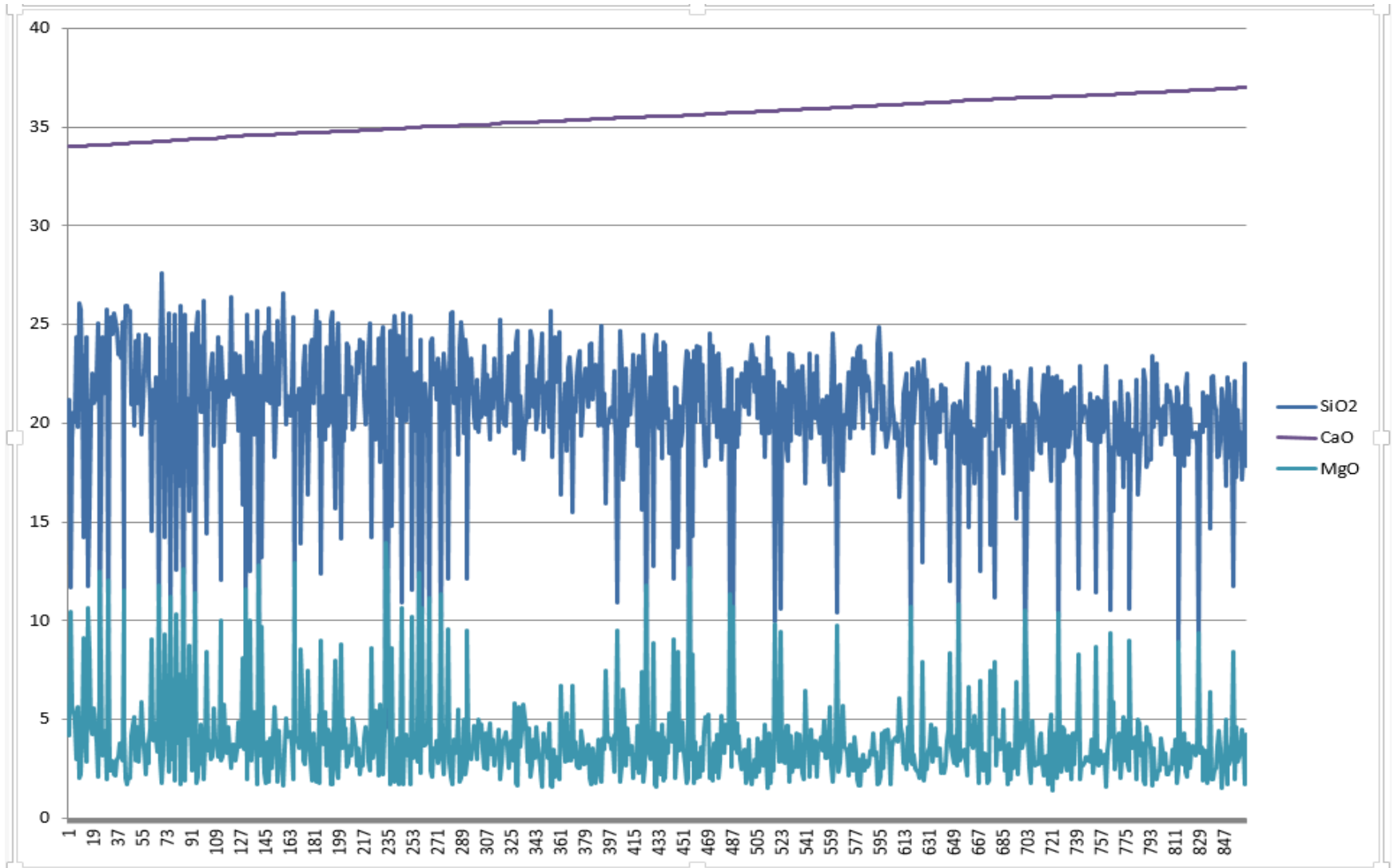
CaO vs SiO₂ & MgO (CaO 41 – 45%)



CaO vs SiO₂ & MgO (CaO 37 – 41%)



CaO vs SiO₂ & MgO (CaO 34 – 37%)



■ Constraints

- Limited reserve of high grade limestone (approx 11.50% of the total reserve so far) for blending and proportionately at very high cost.
- Allotment of low grade coal to Cement Sector.
- E – Auctioning policy for linkage Coal w.e.f. May 2018.
- Limitations in use of Pet coke on account of high sulphur, increasing price trend in Indian and international market.
- Stringent BIS norms for Cement quality unlike in European and other countries.
- Inflexible lease and EC conditions for Captive lease holder of high grade reserve to sale their sub grade.

■ **Way Forward**

- **Extensive research work needed to optimise use of low grade limestone for clinkerisation and Cement manufacturing.**
- **BIS to permit manufacturing of Blended Cement with LS addition.**
- **Larger Focus on detail Exploration to ascertain the total potential of Mineral Blocks in terms of quality and quantity before Auction to decide the optimum quarry life by planning suitable blending.**

The expenditure on Exploration in India is too small w.r.t. that of other countries and agencies for Exploration are in counted numbers.

- **With new Exploration Policy and NMET in place and limited reserve of high grade limestone available for blending, threshold value should be decided for each mineral block individually.**
- **Intervention of Govt, through policy for allotment of better quality of coal to Cement sector to optimise use of low grade limestone.**

■ Conclusion

- **With the existing Cement manufacturing technology, limited beneficiation system this is not the right time to further reduce threshold values of limestone. Revision in threshold value will only be possible with technological upgradation.**
- **Existing threshold value of limestone is very low and renders itself unfit for manufacture of cement. For the lease holder heaving reserve of limestone falling in the range of 34 – 38% of CaO, it's a huge financial liability for them to consume or stack the same.**
- **Looking to the nature of deposit, geographical location and availability of suitable high grade deposits and additives, the threshold value should be decided individually for each mines and should not be common for states and region.**

Thank you

mycem
for better building

Safety is our
foremost priority

