VOLUME 6

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

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National
Skill Development
Corporation
Transforming the skill landscape

Human Resource and Skill Requirements in the Construction Material and Building Hardware Sector

(2013-17, 2017-22)

cutting through complexity

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Acknowledgement

We are grateful to the Government of India and its various departments, State Governments, Industry Associations, Sector Skill Councils, Skill Training Institutions, Academia and NGOs, for their contribution towards the successful completion of the Sector Skill Gap study (2013-2017, 2017-2022).

We would like to thank all NSDC's industry and training partners for their active participation. The success of the study has been possible through their collaborative efforts.

In addition, we convey our gratitude to all those who have, in some way or other, contributed towards the successful completion of this study.

Executive Summary

Key Growth Drivers for Construction Material and Building Hardware sector

Cement

Demand Drivers

- Demand for Cement is derived from the growth of housing, infrastructure and commercial real estate sectors
- Demand expected to reach 6-7% by 2016-17 and achieve 8-10% by 2020

Strong linkages with Construction sector

- There are no close substitutes to cement
- The only exogenous factors that can affect the growth of the cement industry are the growth prospects of the construction and infrastructure sectors

Cement Outlook

Greener Technology adoption

- Focus is on emission reduction, since cement production is one of the most energy intensive industries. Investment of INR 60,000 crores required for technology up-gradation
- Alternate fuels are being encouraged to be used in kilns have also resulted in considerable cost reduction

Policy Environment

- Credit availability for housing and real estate also expected to ease
- Cement has one of the highest rates of excise tax, that could threaten its growth prospects

Steel

Demand Drivers

- Strong focus on infrastructure development with spending targets of more than $1 trillion envisaged in the 12th Five year plan.
- Middle class population in India is expected to reach 600 million by 2030.

Supply Drivers

- Robust investments: Investments are planned to boost the production capacities of steel plants by existing players in the next five years.
- Use of advanced technologies:

Steel Outlook

Competitive advantage

- Leader in production
- Low-cost manpower

Policy Environment

- Advent of liberalisation and free trade policy: Freedom to set up integrated steel plants in the private sector;
- Placing imports of steel under OGL (open general licence)

Key Growth Drivers – Bricks and Refractory material Segment

Demand Drivers

- Strong growth in the construction sector
- Large Demand in urban centers
- Population growth and rapid urbanisation
- Growing demand for housing

Strong linkages with Construction sector

- The only exogenous factors that can affect the growth of the bricks industry are the growth prospects of the construction and infrastructure sectors
- Use of AAC and RC bricks becoming popular

Bricks Outlook

Greener Technology adoption

- In order to reduce emissions, Government is promoting use of resource efficient bricks and improving the overall efficiency in brick making

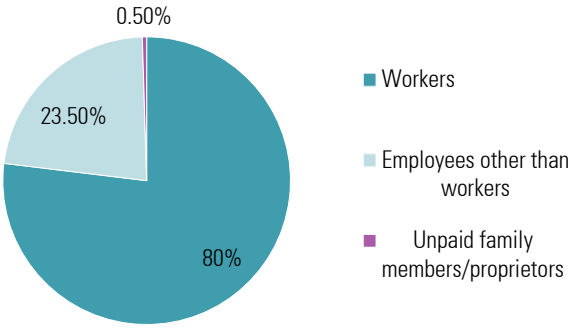
Policy Environment

- Though the policy environment has not been completely favorable for the brick making business, upgrading to new technologies has opened new venues of opportunity for players in the sector

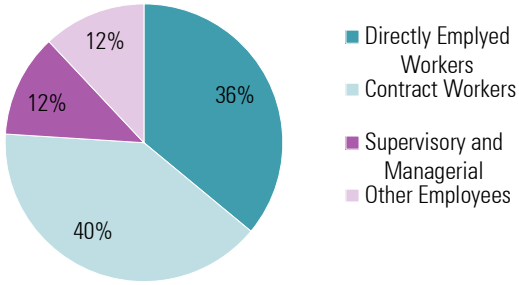
Demographic characteristics of workforce

Predominantly unorganized nature of workforce in the industry

Workforce composition – Cement

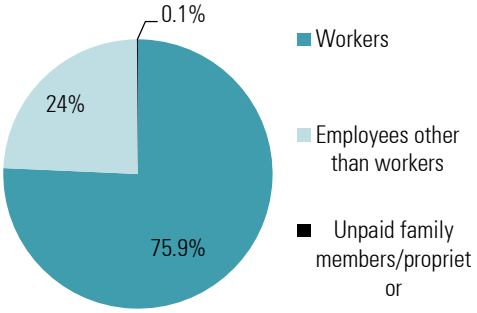


The cement manufacturing sector is dominated by worker who account for nearly 76% of the total workforce.

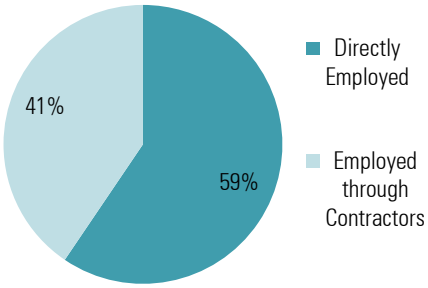


Supervisory and managerial levels constitute 12% of the total workforce.

Workforce composition – Steel

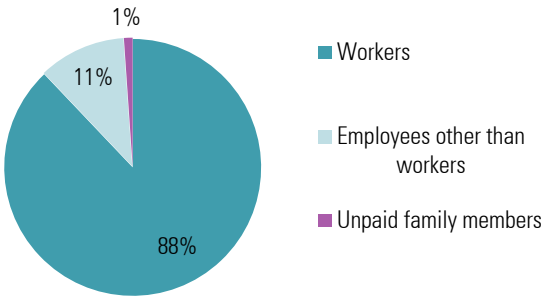


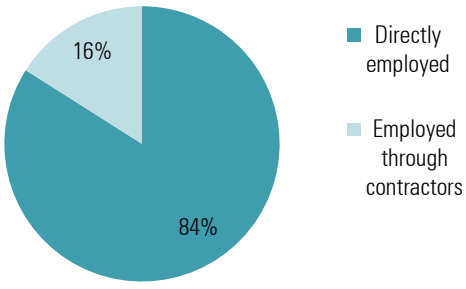
Apart from the directly employed, those who are employed through contractors represent the largest (14%) section of the workforce.



There is a strong presence of **contract workers** in the steel sector, with over 59% of the composition of workers constituting contract workers.

Workforce composition – Bricks and Refractory material Segment



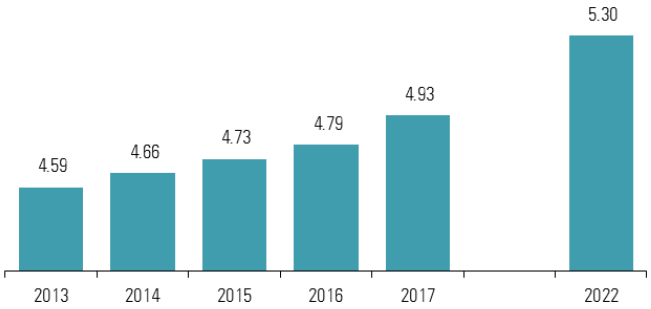


Sources: Industry Interactions; KPMG in India analysis

Incremental Human Resource Requirement (2013-22)

Current workforce of 8.2 million (2013) is expected to increase to ~10.9 million by 2022

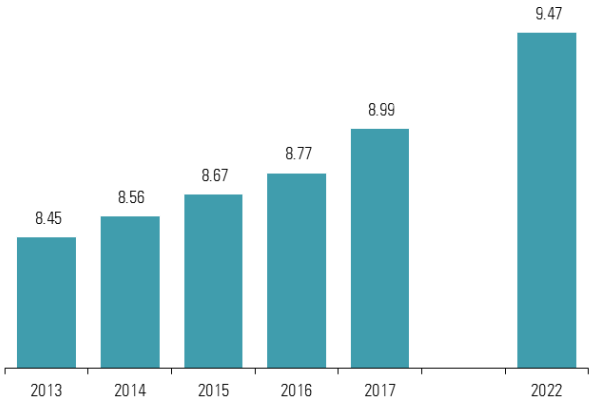
Workforce Projection in 2013-22 (in lakhs) - Cement



Source: Primary Interactions, KPMG Analysis

The cement sub-sector currently employs ~0.45 million employees which is expected to increase in the nine year period 2013-22 to ~0.53 million.

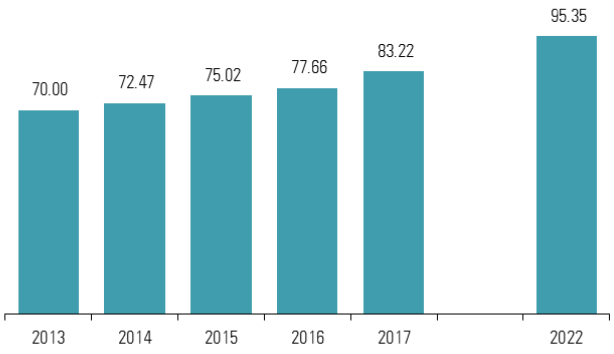
Workforce Projection in 2013-22 (in lakhs) - Steel



Source: Primary Interactions, KPMG Analysis

The iron and steel sub-sector currently employs ~0.8 million employees which is expected to increase in the nine year period 2013-22 to ~0.95 million.

Workforce Projection in 2013-22 (in lakhs) - Bricks and Refractory material Segment



Source: Primary Interactions, KPMG Analysis

The bricks, mortar, stone and other materials retailing sub-sector currently employs ~7 million employees which is expected to increase in the nine year period 2013-22 to ~9.5 million.

Supply & Training Infrastructure

Available training infrastructure is largely defined by the industry and its in-house training provisions

Cement manufacturing is increasingly **mechanised** and **computer simulation oriented**. There is also an impetus towards the promotion of nanotechnology-based production methodologies. This demands the creation of new job roles and increased skill sets in order to match the changing characteristics of production as well as in order to cope with the production capacity expansion of 150 MT expected during the Twelfth Plan period.

Building Materials and Technology Promotion Council, New Delhi	
So far, more than 800 construction professionals and 2000 masons, bar benders, plumbers, artisans have been imparted hands-on training.	Sustainable Construction and Green Construction Practices; Earthquake Resistant Design and Construction; Concrete Mix - Design and Quality Control; Water Proofing and Damp Proofing; Quality Control and Assurance in Construction; Use of Chemical and Mineral Admixtures for Concrete Construction; Repair, Maintenance & Rehabilitation of Buildings including Seismic etrofitting Use of Bamboo in Building and Housing Construction
Dalmia Institute for Scientific and Industrial Research, Rajgangpur, Orissa	
Testing and evaluation of refractory related raw materials, intermediate and finished products and their application in different industries, Human Resources Management, TQM, ISO and Application of IT to refractory industries. (6 weeks)	Engineer, Production Manager, QC/R&D Manager, Chemists and Supervisors working in Manufacture or use of Ceramic and Refractory Materials of Colombo Plan Countries
Application of refractory products in different industries, financial, personnel and Human Resources management, TQM, TOC, IT, ISO:- scope, application and benefits to refractory industries (2 weeks)	Production manager, Engineer, Marketing Manager, R&D/QC Manager, Supervisors and middle decision makers of Colombo Plan Countries
J. K. Cements Training Institute, Nimbahera, Rajasthan	
The training centre is equipped with modern training aids and caters to competency development needs of more than 25 cement plants of northern India. It sources students from Rajasthan and other states	Training is also provided to workers from other cement plants Advanced Skill building training for workers with 5-10 years of experience
Short term courses: 3-5 days; Long term courses: 1-12 weeks	
National Council on Cement and Building Materials, Hyderabad and Ballabhgarh	
Recommended to be the national nodal for skill development in the cement industry. It is the only organisation that caters to training entry level as well as working professionals.	Certificate courses in individual areas of cement technology for 2-3 months; Computer based training programmes for operators and technicians; Distance Learning Programme - one year Post Graduate Diploma in cement technology; Refresher courses on specific subject of cement manufacturing of 5 to 30 days

Source: KPMG Analysis; Stakeholder interactions

Select recommendations & implications

Recommendation	Implications
Strengthening the training framework to match the changing industry requirements	▪ Training infrastructure will be standardized and comparable across providers ▪ Coordination between stakeholders in order to identify the skill gaps and appropriate mechanisms to deal with them ▪ Licensing of providers will help in monitoring compliance, regulation and accreditation of training
Institutional measures to have relevant checks for monitoring of agencies	▪ Creation of a nodal agency to monitor the training ecosystem in the sector is crucial to standardize the training and evaluate its quality ▪ This will require consultation between the industry, training providers and potential trainees
Training curriculum development to align the skill set imparted along with industry requirements	▪ Existing workforce will be awarded certification by RPL in order to ensure effective delivery of appropriate training for appropriate levels

Table of Contents - Detailed Report

Abbreviations

ASI	Annual Survey of Industries
CAGR	Compounded Average Growth Rate
CMA	Cement Manufacturer's Association
FTP	Foreign Trade Policy
FY	Financial Year
FYP	Five Year Plan
GDP	Gross Domestic Product
MOSPI	Ministry of Statistics and Programme Implementation
MSMEs	Micro, Small and Medium Enterprises
MTA	Million Metric Tonnes Annually
MTPA	Million Tonnes per annum
MW	Mega Watt
NCB	National Council on Cement and Building Materials
NIC	National Industry Classification
RTC	Regional Training Centers
TPD	Tonnes per Day
YoY	Year on Year

Context and Approach

Brief background	▪ NSDC had conducted sector-wise skill gap studies for 19 high priority sectors in 2008–09 . ▪ KPMG has been engaged as a consultant to help evaluate the skill gap across 25 sectors and develop actionable recommendations for its stakeholders. ▪ Mandate includes sector and sub-sector level analysis, demand-supply projection, estimation of incremental man-power requirement between 2013-2017 and 2017-2022, identification of key-employment clusters, and SWOT analysis of each sector ▪ Study also aims to take qualitative insights from stakeholders on enablers and challenges for each sector, way forward in terms of specific policy level actionable recommendations,
Inclusions over the previous study	▪ Study led by industry – Sector Skill Councils and a panel of professionals from different sub-sectors were consulted for their inputs on industry trends, key takeaways in terms of skill requirement, qualitative insights to understand specific interventions required for each sector and to validate the quantitative results and recommendations ▪ 6 sectors were added to the list of NSDC priority sectors for studying the skill gaps Updated study also includes ▪ Identification of top 20 job-roles in each sector, case studies around good training practices, sub-sector level indicators and growth factors ▪ Study also includes understanding of existing training infrastructure, work-force characteristics and employment clusters, ▪ Macro economic factors, central and state governments policies and their envisaged impact ▪ Synchronisation of the sector wise demand from the district level skill gap studies ▪ Recommendations for key stakeholders - Industry, NSDC, Training organizations and Government ▪ Environment scans every year till 2015-16 including SWOT analysis for the sector

Industry classification

The sector is sub-divided into three key sub-sectors

Section C: Manufacturing Division: 23, 24

Groups	Class	Description
SUB-SECTOR I:CEMENT		
239	**Manufacture of non-metallic mineral products n.e.c**	
	2394	**Manufacture of cement, lime and plaster**
	23941	Manufacture of clinkers and cement
	23942	Manufacture of Portland cement, aluminous cement, slag cement and similar hydraulic cement
	23943	Manufacture of asbestos cement
	23944	Manufacture of quicklime, slaked lime and hydraulic lime (excluding chewing lime)
	23945	Manufacture of plasters of calcined gypsum or calcined sulphate
	23949	Manufacture of other cement and plaster n.e.c.
	2395	**Manufacture of articles of concrete, cement and plaster**
	23951	Manufacture of plaster statues and other plaster products
	23952	Manufacture of articles articles of concrete, cement or artificial stone (tiles, bricks etc.)
	23953	Manufacture of asbestos sheets
	23954	Manufacture of R.C.C. bricks and blocks
	23955	Manufacture of hume pipes and other pre-fabricated structural components of cement and/or concrete for building or civil engineering
	23956	Manufacture of insulation boards of vegetable fiber, straw or wood waste, agglomerated with cement & other mineral binders
	23959	Manufacture of other cement and asbestos cement products n.e.c.
SUB-SECTOR II: STEEL		
241	**Manufacture of basic iron and steel**	
	2410	**Manufacture of basic iron and steel**
	24101	Manufacture of pig iron and spiegeleisen in pigs, blocks or other primary forms
	24102	Manufacture of direct reduction of iron (sponge iron) and other spongy ferrous products
	24103	Manufacture of steel in ingots or other primary forms, and other semi-finished products of steel
	24104	Manufacture of ferro-alloys
	24105	Manufacture of hot-rolled and cold-rolled products of steel
	24106	Manufacture of tube and tube fittings for iron and steel
	24107	Manufacture of railway track materials (unassembled rails) of steel
	24108	Manufacture of wire of steel by cold drawing or stretching
	24109	Manufacture of other basic iron and steel n.e.c
243	**Casting of metals**	
	2431	Casting of Iron and Steel (Includes activities of iron and steel foundries)
	24311	Manufacture of tubes, pipes and hollow profiles and of tube or pipe fittings of cast-iron/cast-steel
	24319	Manufacture of other iron and steel casting and products thereof

Source: NIC Classifications, MOSPI (2008)

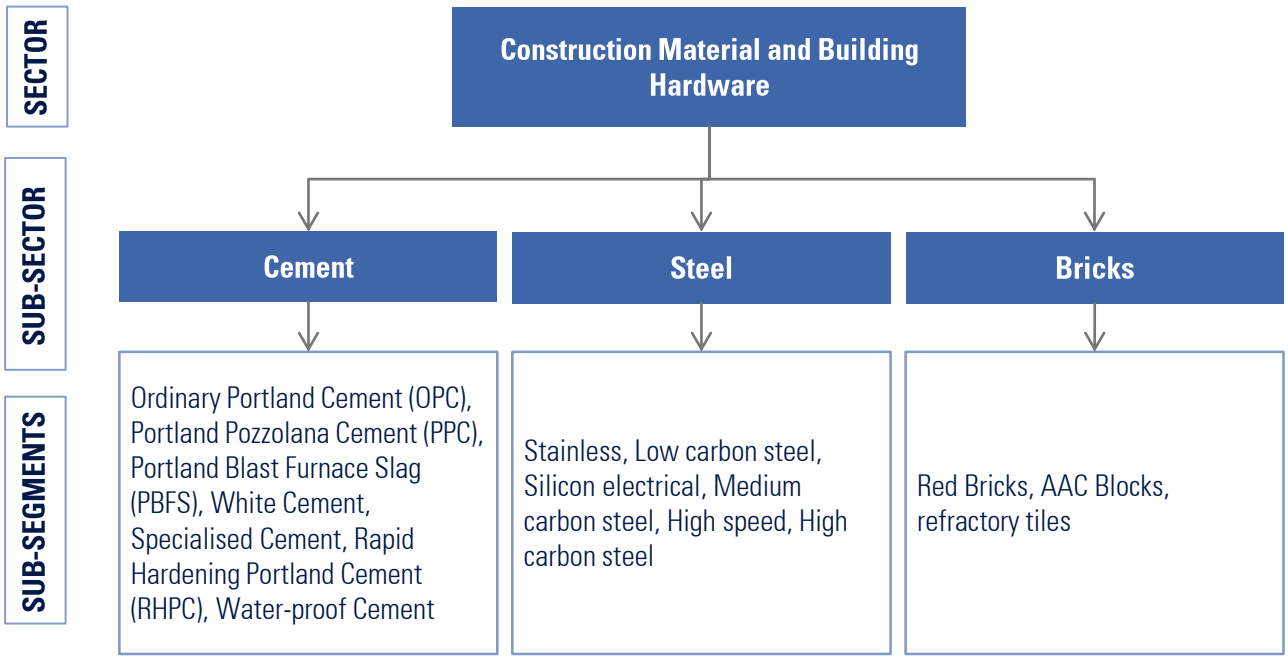
The sector is sub-divided into three key sub-sectors

Section C: Manufacturing Division: 23, 24

SUB-SECTOR III: BRICKS		
239	**Manufacture of non-metallic mineral products n.e.c**	
	2391	**Manufacture of non-metallic mineral products**
	23911	Manufacture of refractory mortars, concrete, etc.
	23912	Manufacture of refractory bricks, blocks tiles and similar refractory ceramic constructional goods
	23913	Manufacture of refractory ceramic products
	23919	Manufacture of other refractory articles n.e.c.
	2392	**Manufacture of clay building materials**
	23921	Manufacture of bricks
	23922	Manufacture of non-refractory ceramic sanitary wares: sinks, baths, water closet pans, flushing cistern etc.
	23923	Manufacture of non-refractory ceramic pipes, conduits, guttering and pipe fittings
	23929	Manufacture of other clay building materials

Source: NIC Classifications, MOSPI (2008)

Major sub-sectors and sub-segments



Industry overview- Cement Segment

A crucial sub-sector with promising investments, capacity expansions and technology up-gradations

Cement Industry Overview

- Almost 100% of cement production feeds into the construction and infrastructure industry, making it a vital sub-sector
- India is the second largest producer and consumer of cement, accounting for 8% of global production, next only to China. India is a key driver of global cement production with an average annual growth rate of 9.8%. Cement production increased at a CAGR of 9.7% to 272 million tonnes over FY06–13. Production is expected to reach 407 million tonnes by 2017
- Cement is a 'low value high density' product. Thus large producers contribute to 97% of production and installed capacity
- India's current annual installed capacity is 350 million tones and production is approximately 245 million tones. Capacity is expected to reach 600 million tones by 2020, based on growth projection of 9-10% per annum.
- Capacity utilization has however been witnessing a steady decline, from 94% in 2006-07, 88% during 2007-08, 84% in 2009-10 to a current utilization of 78% in 2013. This is due to increasing capacity and reducing demand (on account of slowdown in the construction and infrastructure sectors). CAGR for production capacity is expected to be 6.8% and Consumption CAGR is expected to be 10.2% for FY11-17
- 98% of the capacity emanates from the private sector underscoring the significance of private sector participation in the cement industry
- Rapid mechanization and the shift to the technologically advanced Dry process of cement manufacturing processes will increase the demand for trained manpower across the value chain
- Cement Industry provides direct employment to 1.4 million people. It is estimated that 1 million tones of cement production provides employment to 50,000 personnel. A modern 1 MTPA cement plan would require 400 skilled technical workers of which 150 would assume managerial and supervisory roles.
- By the end of the 12th FYP it is expected that the Cement Industry will require an additional 66,000 technical personnel, including 23,000 engineers and supervisors. Additionally, 50,000 unskilled workers will also be in demand
- There is a practice of training entry-level recruitments to make them industry-ready among the large scale companies. Average duration of this training is 3 to 6 months. The National Council for Cement and Building Materials also provides requisite training over short-term and long-term

Cement Outlook

Demand Drivers

- Demand for Cement is derived from the growth of housing, infrastructure and commercial real estate sectors
- Demand expected to reach 6-7% by 2016-17 and achieve 8-10% by 2020

Strong linkages with Construction sector

- There are no close substitutes to cement
- The only exogenous factors that can affect the growth of the cement industry are the growth prospects of the construction and infrastructure sectors
- Demand for cement is derived and contingent on performance of key sectors

Greener Technology adoption

- Focus is on emission reduction, since cement production is one of the most energy intensive industries. Investment of INR 60,000 crores required for technology up-gradation
- Alternate fuels are being encouraged to be used in kilns have also resulted in considerable cost reduction

Policy Environment

- 12th FYP aims to boost investment in infrastructure by USD 1 trillion
- Credit availability for housing and real estate also expected to ease
- Cement has one of the highest rates of excise tax, that could threaten its growth prospects

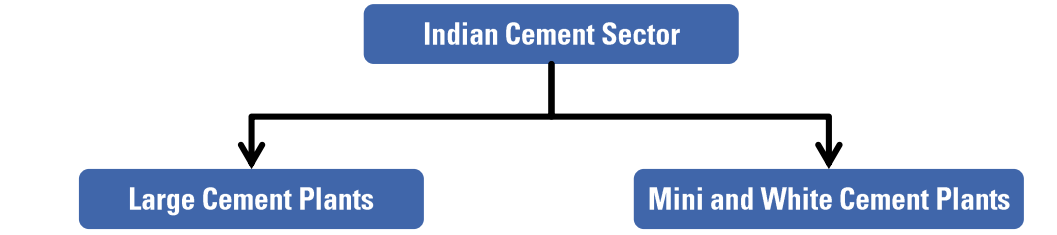
Sources: KPMG analysis, Planning Commission 12th FYP Working Group on Cement Industry (2011), Indian Cement Review (2012)

The cement sector is evolving into a more competitive, sustainable and advanced industry

Changing structure of cement industry

COMPETITIVENESS: Evolution of Indian Cement Industry through eras of control and liberalisation

Current structure of cement industry



Number of Cement Plants	185
Installed Capacity	339.5 mtpa
Cement production	168.3 mtpa*

Number of Cement Plants	365
Installed Capacity	11.1 mtpa
Cement production	6 mtpa*

** Data from FY12*

1914: Birth of the Indian Cement Industry at Porbandar, Gujarat

1947-1969: rapid growth phase

1969-1982: Control Period

1982-1989: Partial decontrol

1989/1991 onwards: total decontrol

Structurally, Indian Cement Industry is unique compared to its global counterparts

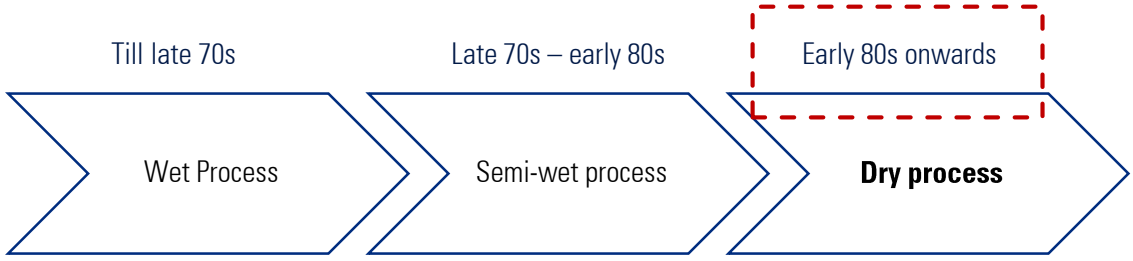
- Globally, cement production is dominated by large plants. In India, around 112 plants have a capacity of 1 MTPA or more Though the Indian cement industry is dominated by large plants that account for ~97% of capacity utilisation, no single company enjoys more than 15% of market share, nationally. There is an increasing presence of small and medium sized players. The Herfindahl-Hirschman is expected to fall from 0.072 in FY2012 to 0.060 by FY 2017, indicating greater competition in the sector.
- The industry is also largely driven by the private sector, that accounts for 98% of the total capacity. With the advent of liberalisation the participation of foreign players in the Indian cement market has also increased, mostly through mergers and acquisitions

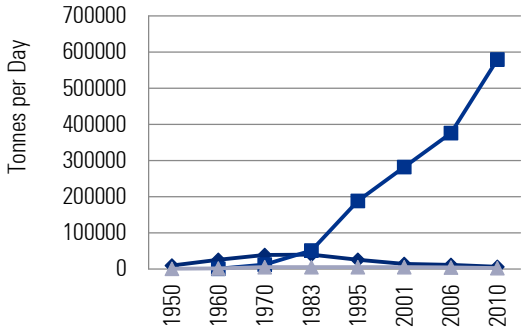
Source: IBEF Cement Sector Analysis (2013); Planning Commission Working Group on Cement Sector (2011); KPMG Analysis

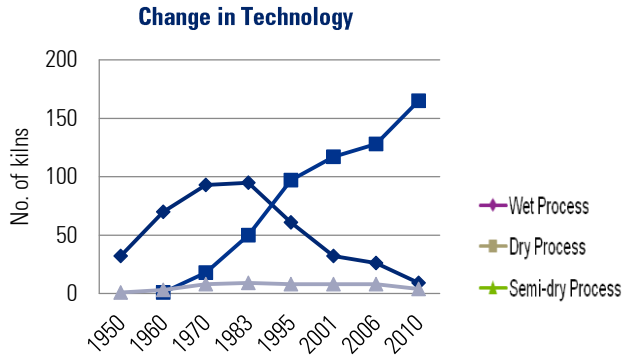
The cement sector is evolving into a more competitive, sustainable and advanced industry

TECHNOLOGY: Shift towards more sustainable Dry Process

	Wet Process		Dry Process		Semi-dry Process	
	No of kilns	Capacity (TPA)	No of kilns	Capacity (TPA)	No of kilns	Capacity (TPA)
1950	32	9151			1	250
1960	70	25011	1	300	3	1200
1970	93	38441	18	11865	8	5000
1983	95	39641	50	51265	9	5500
1995	61	25746	97	188435	8	5244
2001	32	13910	117	282486	8	5260
2006	26	11420	128	375968	8	4195
2010	9	5950	165	579961	4	2320







- Presently, most kilns comprise of either Dry Suspension Preheater or Dry Calciner Plants
- The wet process is more energy intensive because extra fuel is required to remove the excess water from the slurry that is fed into the kilns for manufacturing cement.

Structural changes to the industry demand skill up-gradation of the human resource

- Several cement plants, established post-1990 have state-of-the-art facilities. These plants are also migrating to computer-simulation based manufacturing processes, to keep abreast with global standards. The following is a summary of certifications awarded to plants across India:

Number of cement plants	Certification
93 large cement plants	ISO-9000 (Quality Management System)
64	ISO-14000 (Environmental Management System)
44	OHSAS-18000 (Occupational Health and Safety Management System)

- Cement industry is also aiming to transform itself into a environment-friendly sector by adopting more sustainable practices. Of late, 75% of the fly ash recycled in the country is being consumed by the Cement industry. It is also a large consumer of blast furnace slag. Both these ingredients are hazardous wastes that pose a serious challenge to their disposal. Adoption of such practices also requires the up-gradation of earlier plants.

- The cost of up-gradation and capacity enhancement of older cement plants (pre-1990) will require a financial infusion of INR 6000 crores. The expected benefits of this up-gradation are:

Increase in capacity	25-30 MTPA
Reduction in thermal energy consumption	15-20 kcal/kg clinker
Reduction in electrical energy consumption	5-10 units/tonne
Reduction in cost of production of cement	5-10% because of above initiatives
Reduction in energy costs through co-processing	10-15%
Reduction in CO2 emissions (through blended cements and energy conservation)	20%

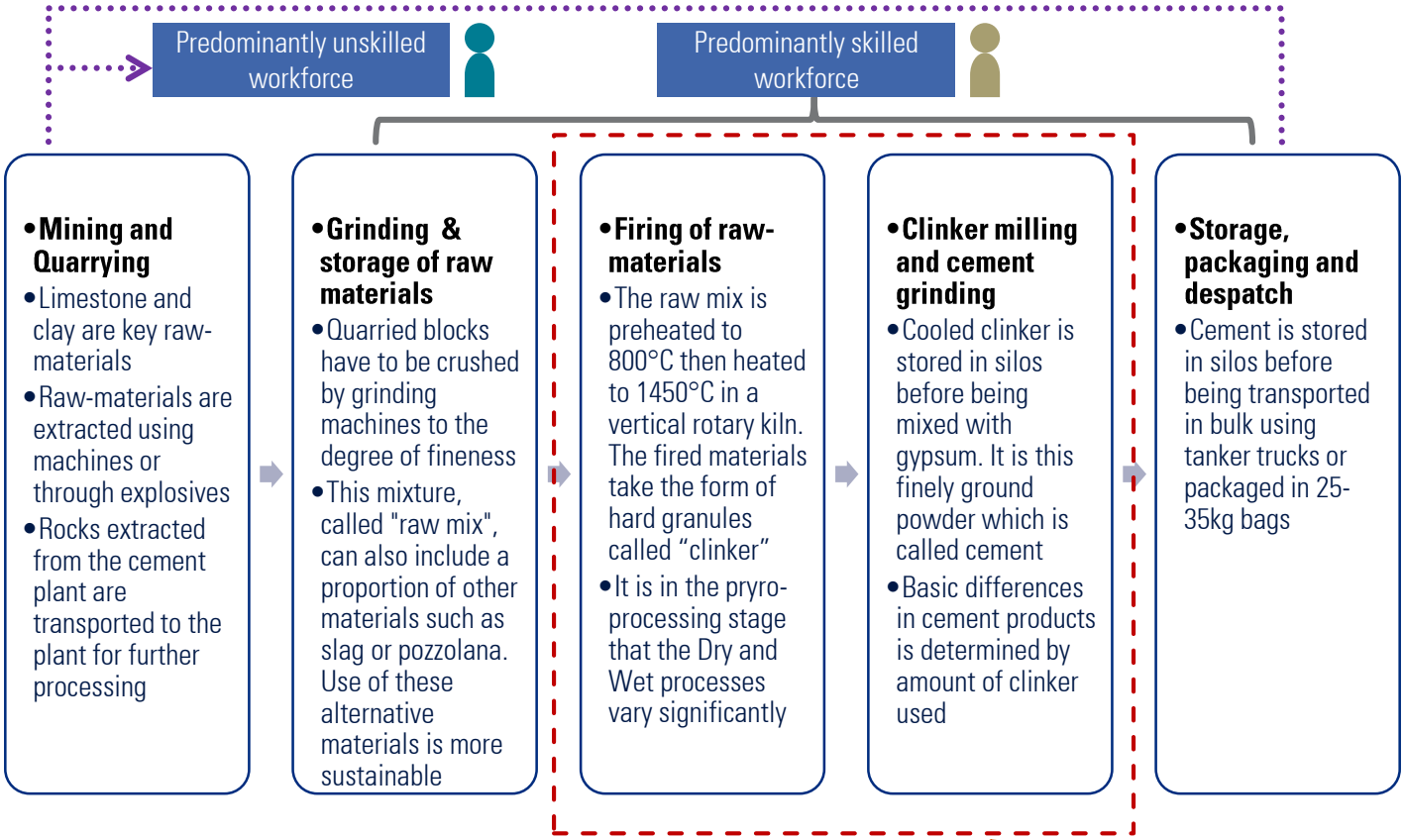
- Government impetus through infusion of USD 1 trillion for infrastructure projects through the Twelfth Plan, the promotion of affordable housing schemes, growth in construction sector demands enhancement of current production capacity of the cement industry. This is expected to create demand for an additional capacity of 150 MTPA. Therefore, total technical personnel requirement by the end of the Twelfth Plan (2017) will be:

43000 personnel	108 million tonnes of Greenfield expansion
17000 personnel	42 million tonnes of Brownfield expansion
6000 personnel	3000 MW of captive power plant expansions
Additionally, 50,000 unskilled workers will also be in demand	

Source: Planning Commission Working Group on the Cement sector (2011), Cement Sector Review (2013)

Manufacturing process (firing of raw materials and cement grinding) most crucial components of the value chain in terms of technological innovation and skill requirement

Scope for 'cost-optimisation', product enhancement and promotion of sustainable practices is maximum in Stages 3 and 4, where clinker is produced and mixed with gypsum to form cement. It is also at this stage that newer technological enhancements that encourage the use of slag and fly-ash are being envisaged. Thus, most skill requirements and newer job roles can be expected in this stage of the value chain



Note: Other activities such as co-generation of power are also significant in the cement manufacturing process. However, they have not been included since they do not represent core activities of cement production

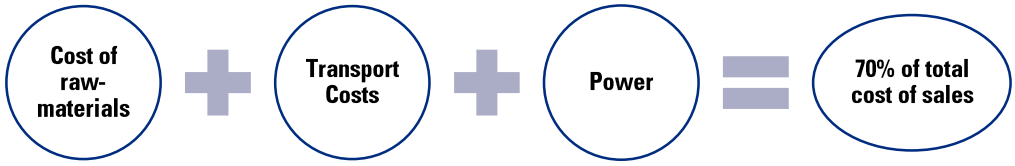
Blended cement promoted as a cost-effective and sustainable option to the usual grade of cements such as OPC, since it uses fly-ash and slag. Clinkerization capacity is often a constraint in the production of cement. Blending allows a company to produce more cement using the same amount of clinker and can re-define its competitiveness. Blended cement accounted for 75% of total production for 2011

Key data based on ASI 2010-11 and NIC 2008 inputs (values in INR ten billion; others in numbers)

NIC Code ➔	2394: Mfr of cement, lime and plaster	2395: Mfr of articles of cement, concrete and plaster	Total
Number of factories	1372	2328	3700
Number of employees (organized)	147898	86230	234128
Total Output	70960	16144	87104
Net Value Added	18197	3539	21736

Source: KPMG analysis; NSSO (2011-12); ASI (2010-11); NIC (2008), stakeholder consultations

The industry has the scope to enhance competitiveness by leveraging product uniqueness, technology and managing input costs. This will influence industry skilling targets

		Degree
DEMAND	**PRODUCT**: Cement is a largely irreplaceable commodity, with virtually no other substitutes and the Indian cement industry is predominantly oligopolistic in nature with limited rivalry between competitors	HIGH
	PRICE: However, due to the presence of regulations to curb monopolistic practices in the sector and its identification as a component under the Essential Commodities Act, 1955, industries cannot take advantage of premium pricing. Therefore, in order to stay competitive, companies must ensure appropriate management of the operating costs	LOW
	LOCATION: Cement is a high volume low value product. This makes it highly freight sensitive. Given the high costs of freight and transportation, especially by rail, many cement plants are located close to their source of raw-materials and markets. This is why the largest cement producing states in the country are also the largest consumers.	NEUTRAL
SUPPLY	**COST**: Irrespective of the grade of cement being manufactured, production of clinker and transportation costs are the two largest components of the total cost of sales, followed by power consumption. Promoting Blended Cement, local consumption and utilising alternative fuels for power generation are ways of mitigating cost and improving competitiveness	LOW
		
	ACCESS TO RAW-MATERIALS: This is determined both in terms of location as well as cost. Cement plants prefer being located closer to limestone quarries and mines and aim to consolidate local markets to mitigate the operating costs (especially transportation). Coal and coke are other key inputs used in power generation for running the cement plants. However, these inputs are managed by the government, who controls their pricing and supply	LOW
	TECHNOLOGY: Most plants have transitioned from wet process manufacturing to the more sustainable dry process manufacturing. A large portion of the manufacturing is highly mechanised and is being undertaken through computer-simulation. It is also expected that the application of nanotechnology to the production process is expected to result in development of eco-friendly, high performance cements / binders and concrete with improved durability	HIGH
	TAXES AND LEVIES: Cement is one of the highest taxed building materials. More than 60% of ex-factory price of cement are constituted of the various government taxes and levies, while the average in Asia Pacific is 11.4%	LOW

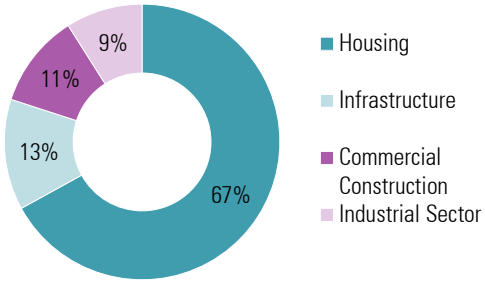
Source: IBEF Cement Sector Analysis (2013); Planning Commission Working Group on Cement Industry (2011); ICRA Analysis, DIPP (2011)

While growth in housing and infrastructure will enhance cement competitiveness, high levels of tax, levies and input costs can contain the industry growth prospects

DEMAND

GOVERNMENT INVESTMENT IN INFRASTRUCTURE THROUGH 12TH FYP: Strong focus on infrastructure development with massive spending targets of more than USD1 trillion envisaged in the 12th FYP is expected to increase the demand for cement and estimates a capacity expansion of 150 MTA. Rapid completion of dedicated freight corridor, widening congested roads and railways, improving loading and transportation infrastructure, addition of large capacity loading facility at ports etc. are some of the key infrastructure development priorities of the Government that are expected to drive the demand for cement.

Key Demand Segments



INCREASE IN HOUSING DEMAND (especially rural areas): According to the 2011 Census, there is a shortage of 11.78 million houses, of which 56% is in the economically weaker sections and 9.4% belongs to lower income groups. The Government is expected to invest in affordable housing schemes such as the Indira Awas Yojana (rural) and Rajiv Awas Yojana (urban) and this is expected to increase housing demand and subsequently cement demand by FY 2015. Rural demand as well as demand from Tier-II and Tier-III cities is expected to drive demand for cement through FY 2015.

INTERNATIONAL COMPETITIVENESS: India exported 3,477,051 tones of cement and clinker amounting to INR 1042 crores in 2011-12. India's target markets are South Asia and Africa, owing to the economic and infrastructure booms in these regions. Maximum volume was exported to Nepal (39%), followed by Sri Lanka (10%).

SUPPLY

ADOPTION OF ALTERNATIVE FUELS TO POWER CEMENT PLANTS AND PROMOTION OF BLENDED CEMENT: A cement plant requires uninterrupted supply of power since the manufacturing process is continuous. Use of alternate fuel like fly ash, slag (that would otherwise become hazardous waste), tyres, biofuel considerably reduces dependence on coal and thus brings down production costs as well as emissions.

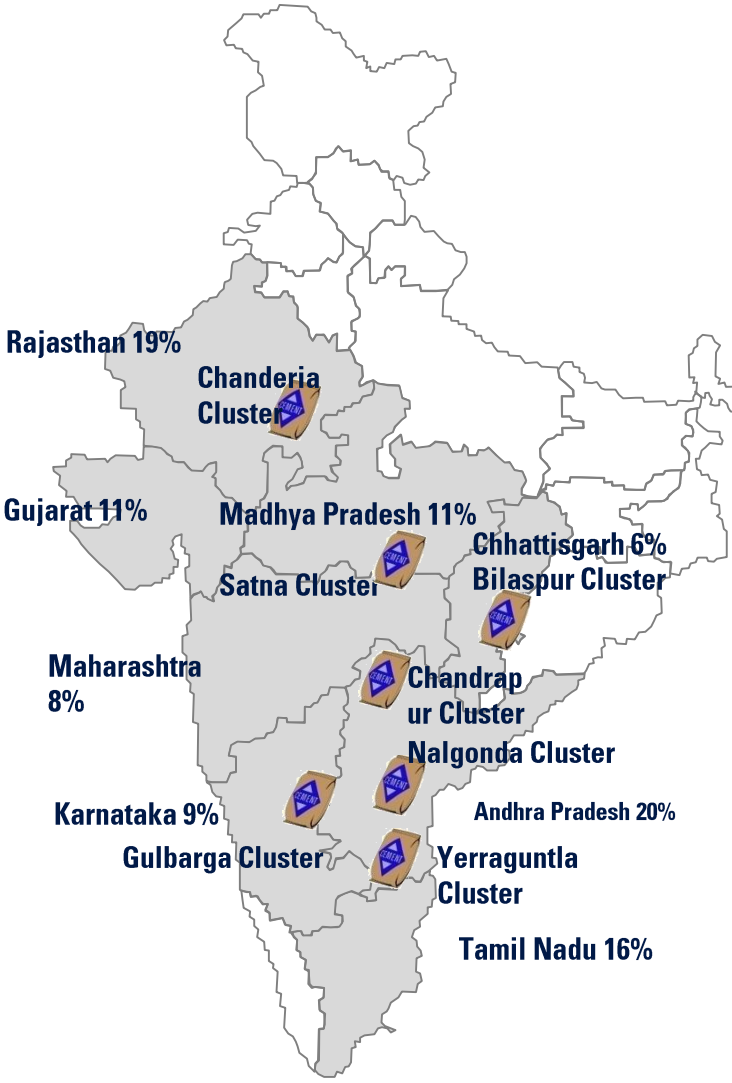
Item	INR/tonne
Average Excise Duty	490
VAT	500
Royalty and cess on limestone	84
Royalty on coal	33
Electricity duty	23
Others, including Clean Energy Cess on fuel	30
Total	**1160**

INPUT COSTS: Coal (high import cost), freight and power constitute 15-20% each of the operating costs. Though the cement industry is dominated by the private sector, more than 40% of the inputs are owned and managed by the government. There is a proposal to allot exclusive coal blocks to the cement industry in order to mitigate the supply uncertainty and cost burden of coal procurement. It is also proposed that the royalty paid on limestone should be neutralized for cement export.

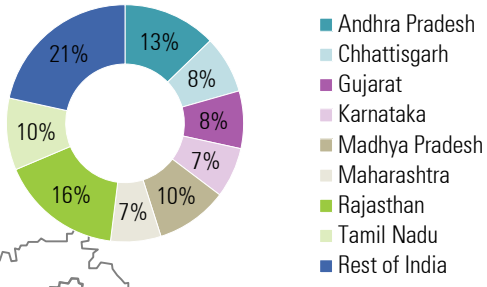
TAXES AND LEVIES: Indian cement industry contributes approximately INR 35000 crores per annum to the national exchequer through various taxes and levies. It is one of the most heavily taxed commodities. It is proposed that the use of sustainable manufacturing practices and emission reductions should translate in appropriate tax exemptions to enhance sector competitiveness.

Source: Fitch Economic Outlook (2014); IBEF Cement Sector Analysis (2013); Indian Minerals Yearbook (2012); Planning Commission Working

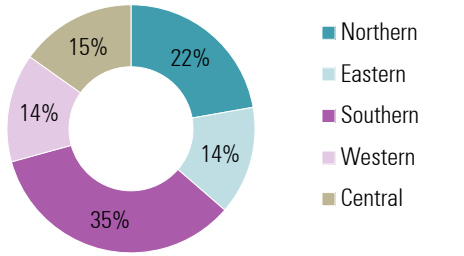
Geographic Distribution of Cement Production -Rajasthan and Andhra Pradesh lead in cement production and consumption



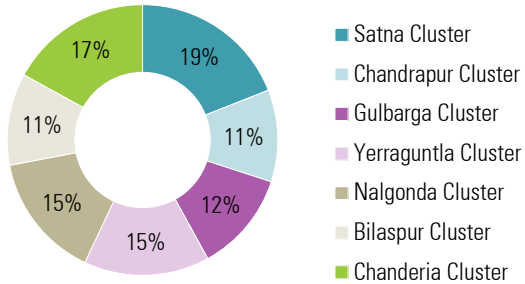
Top Cement Consumers—State-wise



Regional Distribution Cement Production Capacity



Cluster-wise Cement Production



Since cement is a low value high volume product, it is **highly freight sensitive**—bulk of the cement produced in a region is consumed within the region. Hence, most of the leading cement producing states are also major consumers of product. This makes determining price trends and capacity utilisation levels more meaningful at a regional level than a pan-India level. Rajasthan, Andhra Pradesh, Tamil Nadu and Madhya Pradesh comprise 50% of the domestic consumers of cement

Andhra Pradesh has the most number of cement plants– 37 large plants, followed by Rajasthan (20) and Tamil Nadu (19). Regional cement production is dominated by the Southern (34%) and Northern (23%) regions that account for more than half the total cement production in India. Maharashtra and Tamil Nadu are the two states that lead in cement production but do not host any production clusters

Source: Planning Commission Working Group on Cement Industry (2011); KPMG Analysis; Lok Sabha Unstarred Question No. 4062

Recent projects and investments indicate expansion of manufacturing units emphasising preparation for the capacity requirements expected by 2022

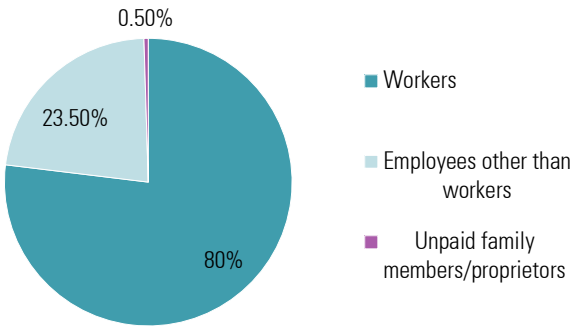
Jharkhand	Shree Vinayak Cement	Expansion of cement grinding unit, Dhanbad	INR 7.5 crore
Bihar	Ramco Industries	Cement grinding plant, Bihiya	2 lakh TPA
West Bengal	Reliance Cements	Cement grinding unit, Purulia	INR 600 crores 3 MTPA
Chhattisgarh	Jindal Steel and Power	Cement manufacturing unit, Raigarh	INR 605 crores 2 MTPA
Gujarat	ABG Cement	Clinker manufacturing unit, Surat	3.3 MTPA
Madhya Pradesh	Reliance Cements	Cement manufacturing plant	INR 3000 crores 5 MTPA
	Abhijeet Cements	Integrated cement plant, Morena	2 MTPA
	Heidelberg Cements	Brownfield expansion, Damoh and Narsimgarh	3.1 – 6 MTPA
	Emami Cements	Cement manufacturing unit, Satna	3 MTPA
Andhra Pradesh	Vertex Cements	Cement manufacturing plant Gangavaram	INR 1,500 crores 2.64 MTPA
	Sanghi Cements	Cement manufacturing plant Guntur	1.5 MTPA
	ACC	Integrated cement plant Cuddapah	5 MTPA
Tamil Nadu	Madras Cements	Limestone beneficiation plant Alathiyur	INR 30 crores 400 TPA
	Madras Cements	Limestone beneficiation plant Alathiyur	4 MTPA
	Ultratech Cements	Greenfield cement plant Alathiyur	INR 2500 crores
Maharashtra	Zuari Cements	Cement grinding unit, Solapur	1 MTPA
Karnataka	Bagalkot Cements and Industries	Expansion of manufacturing plant, Bagalkot	INR 450 crores 1000 -1650 TPD
	Gulbarga Cement	Integrated cement plant, Gulbarga	INR 1600 crores 3.2 MTPA

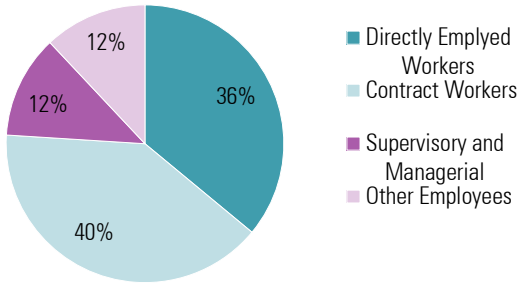
Multi-state		
ACC	3 grinding units and a clinker facility. Jharkhand and Chhattisgarh	INR 3300 crores 4 MTPA
Ultratech Cements	Clinker plant, grinding facility, capacity expansion. Chhattisgarh, Maharashtra, Gujarat	2.15 MTPA
Birla Corporation Ltd	Expansion of manufacturing plant. Chanderia in Rajasthan and Assam	INR 2500 crores
Holcim	Plant expansion. Marwar Mundwa project in North Central India	4 MTPA

Source: KPMG Analysis; Project Analysis

Demographic and workforce characteristics: Supervisory and managerial roles will be the targets for skill up-gradation

Workforce Composition

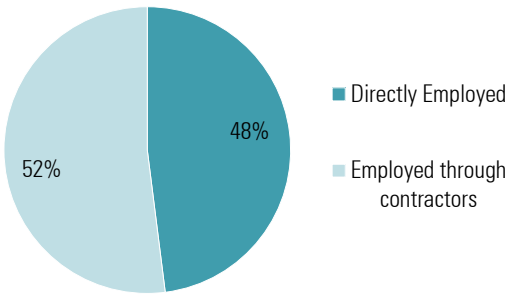




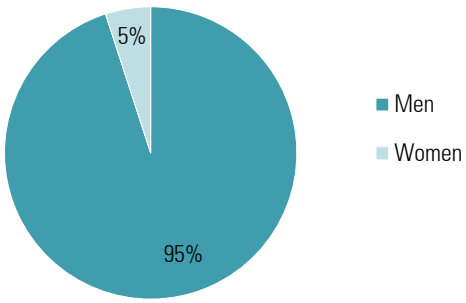
The cement manufacturing sector is dominated by **workers*** who account for nearly 76% of the total workforce. Regional Training Institutes set up by the industry should target to train workers in interactive Computer Based Training (CBT) programmes, given the expected investments in plant up-gradations envisaged through the Twelfth Plan period

Supervisory and managerial levels constitute 12% of the total workforce. The Working Group for the Twelfth Plan estimates an additional requirement of 23000 engineers and supervisors in order to cope with the envisaged capacity expansions. Since the new plants that will be developed will be based on state-of-the-art technologies, skilling up of supervisory roles at plants will become crucial.

Composition of workers



Directly employed workforce



There is a strong presence of **contract workers** in the cement sector, with over 50% of the composition of workers constituting of contract workers.

The sector is dominated by a **male workforce** that constitutes 95% of the directly employed workforce

Source: ASI 2010-11

*Note: ASI defines a worker as "a person employed directly or through any agency whether for wages or not and engaged in any manufacturing process or in cleaning any part of the machinery or premises used for manufacturing process or in any other kind of work incidental to or connected with the manufacturing process or the subject of the manufacturing process. Labour engaged in the repair & maintenance, or production of fixed assets for factory's own use, or employed for generating electricity, or producing coal, gas etc. are included." ASI only covers the organised sector and these statistics are representative of the same

Select policy initiatives at the union and state levels and market developments. Policies pertinent to coal, minerals and power will impact cement

Pan-India recent policy developments that will impact cement production	
Infrastructure Investments	Infrastructure projects in the PPP domain, worth Rs 1 trillion will be rolled out in the next 6 months. Principal Secretary in the PMO will monitor these projects The PM's Steering Committee will accelerate infrastructure investments. It has set deadlines for awarding of projects including Mumbai Rail Corridor and Navi Mumbai Airport
Foreign Trade Policy (2009-2014)	The Export and Import Policy incorporated in the FTP for cement is free. The import of cement includes portland, white, aluminous, slag, super sulphate and similar hydraulic cements. This is to catalyse India's exports and imports of cement to aid growth and industrial activity.
National Manufacturing Policy	Has set the goal of increasing the share of manufacturing in GDP to 25 percent and to create 100 million jobs over a decade
Coal Regulatory Authority Bill, 2013 (pending)	Seeks to establish a Coal Regulatory Authority of India that will manage and regulate the supply and information pertaining to coal in India.
Emission Standards set by Ministry of Environment and Forests, 2006	Cement processes are required to use better equipment to achieve energy efficiency and meet environmental standards . The permissible limit for stack dust emissions from new cement plants in the country is 50mg/Nm3 (for existing plants, this is 150 mg/Nm3 and 100 mg/Nm3for critically polluted areas)
Key State-level policy initiatives	
Madhya Pradesh	**Industrial Promotion Policy 2010**: Aims to attract investments to boost the pace of industrial development, ensure faster economic development and employment (effective till 2015) Investment Promotion Assistance (**VAT and CST refund scheme**), entry tax exemption to help ease regulatory burden on industries **Mineral Policy 2010**: Aims to encourage private sector participation for minerals exploration using latest technologies for search and assessment of deposits. Additional support to be provided through Mineral Development Fund
Andhra Pradesh	**State Policy on Coal Mining** to augment coal production to meet the growing demand for the coal within the State and outside the State and also to fulfill the statutory obligation of mining in tribal areas through Public Sector Undertakings, generation of employment, assured power supply in the State for industrialization etc.
Rajasthan	**Mineral Policy 2011** aims to promote proper use of mineral resources of the State and for sustainable economic development. Cement grade limestone and gypsum are important minerals for the cement industry.

Source: Minerals Yearbook (2012) Indicative georgraphical distribution of policies related to cement manufacturing

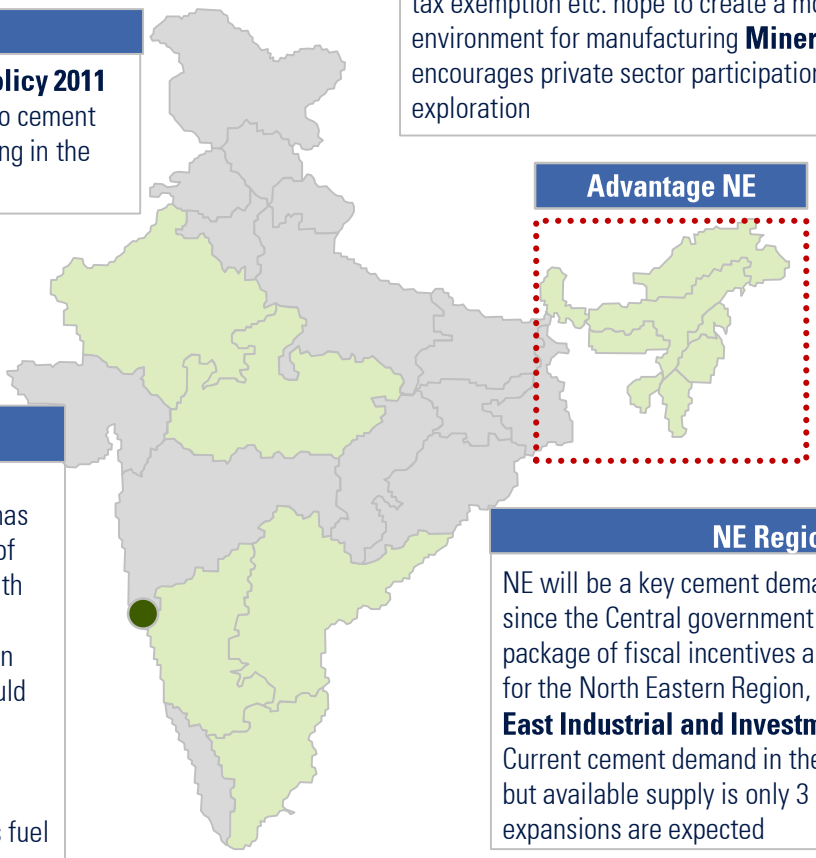
Geographic representation of key state-level policy initiatives

Madhya Pradesh

MP's **Industrial Promotion Policy, 2010** and Investment Promotion Assistance (VAT and CST refund scheme), entry tax exemption etc. hope to create a more conducive environment for manufacturing **Mineral Policy, 2010** encourages private sector participation in mineral exploration

Rajasthan

Rajasthan Mineral Policy 2011 aims to provide a fillip to cement mining and manufacturing in the State



Advantage NE

Goa

The Goa State Pollution Control Board (GSPCB) has signed a memorandum of understanding (MoU) with Vasavdatta Cement, a company with its plant in Karnataka. The firm would use the plastic waste collected by the state agencies and village panchayats from Goa as fuel for its manufacturing plant.

NE Region

NE will be a key cement demand driver especially since the Central government has approved a package of fiscal incentives and other concessions for the North Eastern Region, namely **the North East Industrial and Investment Policy, 2007** Current cement demand in the region is 5.2 MTPA, but available supply is only 3 MTPA. Thus, capacity expansions are expected

Tamil Nadu

Tamil Nadu State Government has increased the price of Fly Ash to Rs. 700 per tonne, as of March 2014. This is expected to affect the competitiveness of cement manufacturers in the state, since Fly Ash is a key raw material for blended cement

Andhra Pradesh

AP's **State Policy on Coal Mining** aims to augment coal demand to meet the growing demand in the State.

SWOT analysis

Strengths	▪ No close product substitute to cement ▪ Very strong correlation with GDP and will hence remain a high priority sector ▪ Very high initial cost of setting up
Weaknesses	▪ Large quantity low value product—heavily dependent on freight and logistics ▪ Energy and resource intensive industry ▪ Current levels of investment in R&D in cement sector very low. This is a significant concern, given India is the second largest manufacturer of cement ▪ Dependence on imported technology remains high in spite of significant domestic demand for machinery ▪ Lack of an available sector skill council till date, poses challenges to the skill up-gradation efforts in a sector with tremendous capacity expansion expectations in the next 5 years. ▪ Quality of domestic gypsum and other raw-materials required in cement production is poor
Opportunities	▪ Promotion of blended cement as a cost-effective and sustainable option ▪ Technological advancement promoting greener production and lesser CO2 emissions ▪ Use of alternative fuels and waste has the potential to reduce production costs ▪ Growth in the Construction and Infrastructure sectors will directly impact sectoral development, especially through housing ▪ Government investment in infrastructure for FY14-15 USD 1 trillion as per Twelfth FYP ▪ Infrastructure projects such as dedicated freight corridors, upgradation of existing and development of new ports and airports, development of new industrial cities on the Delhi-Mumbai Industrial Corridor, etc. are expected to enhance the demand for capacity and production of cement ▪ Real estate is expected to become a USD 180 billion sector by 2020 ▪ Specifically, demand is expected to be fuelled by rural, tier-I and tier-II cities ▪ 577 SEZs granted formal approval ▪ Growth in housing demand and government's promotion of affordable housing schemes
Threats	▪ Rising coking coal prices ▪ The problem of delayed approvals and regulatory clearances will continue being a problem ▪ Land acquisitions and rehabilitation problems ▪ Import penetration and dumping are major threats due to cheaper imports from Japan and China ▪ Obtaining capital for projects and high interest on loans ▪ New technologies such as the Corex process and Hismelt process are power intensive.

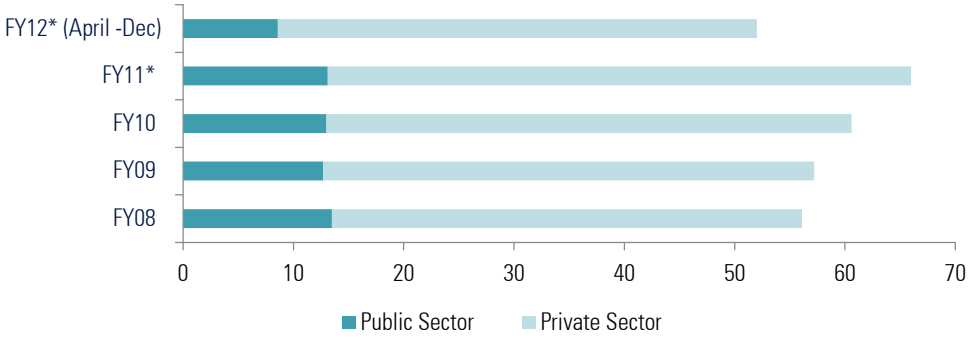
Source: Industry Analysis, Working Group for Twelfth Plan (2011), KPMG Analysis

Industry overview- Steel Segment

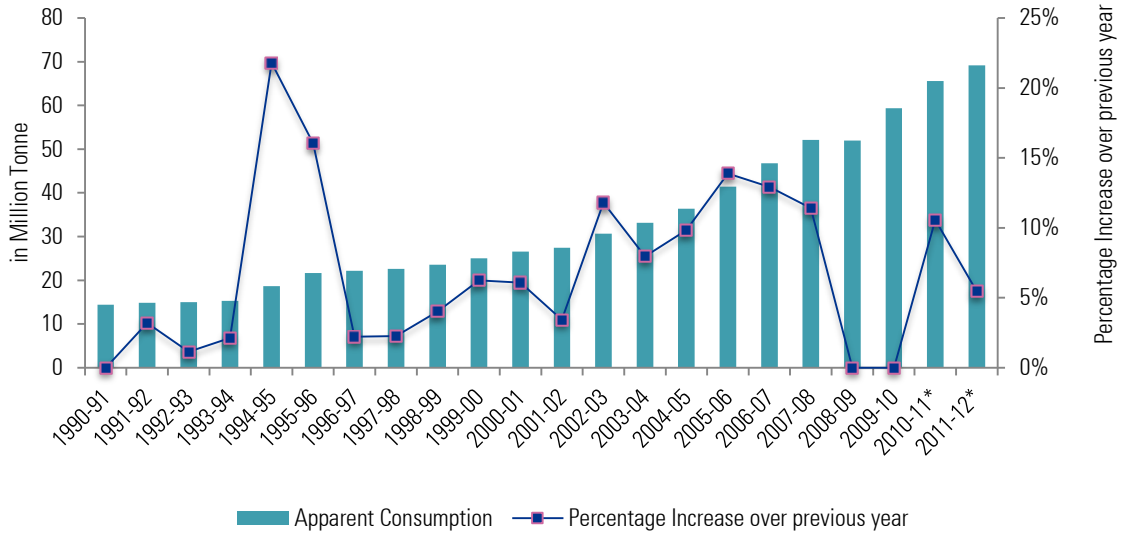
A crucial sub-sector with strong growth potential in capacity, market value, demand and technology in a conducive policy environment

Steel Industry Overview

- The Steel industry in India is poised for unprecedented growth in the next fifteen years with emerging focus on large scale infrastructure development in the twelfth five year plan. Indian steel industry is globally very attractive currently contributing to 4.7 percent of the global steel production. YoY value growth of 2-3% is expected over the next 5 years and a 5-7% volume growth is expected during the same period.
- The country's steel production has grown about 10 percent per year from 27 million tonnes in 2001 to 72 million tonnes in 2011, majority of it from private sector. The market value of the steel industry in India stood at USD57.8 billion in 2011. Steel production has been dominated by the private sector, with trends indicating that this observation will continue



- The market value of the industry has registered strong growth benefiting from price rise since the beginning of the millennium. During the period2007–11, the industry has experienced growth in market value at an astounding CAGR of 17.7 percent.
- Demand for steel in the infrastructure sector alone is likely to reach more than 40 million tonnes in the next few years. The figure below illustrates the apparent consumption of finished steel in India during the period 1990-2012.



Sources: KPMG analysis, Planning Commission 12th FYP Working Group on Steel Sector (2011), IBEF Industry Analysis (2013)

A crucial sub-sector with strong growth potential in capacity, market value, demand and technology in a conducive policy environment

Steel Outlook

Demand Drivers

- **Huge Infrastructure Spending:** Strong focus on infrastructure development with spending targets of more than $1 trillion envisaged in the 12th Five year plan.
- **Rising middle class population:** Middle class population in India is expected to reach 600 million by 2030.

Supply Drivers

- **Robust investments:** Investments are planned to boost the production capacities of steel plants by existing players in the next five years.
- **Use of advanced technologies:** Efforts are taken to match the quality of production with global standards.
- This is likely to attract several investors.

Competitive advantage

- **Leader in production:** India is the world's fourth-largest producer of crude steel (up from eighth in 2003); the country is expected to become the second-largest producer by 2015.
- **Low-cost manpower:** Easy availability of low-cost manpower make India competitive in the global setup.

Policy Environment

- **Advent of liberalisation and free trade policy:** Freedom to set up integrated steel plants in the private sector;
- Placing imports of steel under OGL (open general licence);
- Reduction of import duties on both steel and scrap;
- Decontrol of domestic prices

COMPETITIVENESS: Evolution of Indian Steel Industry through eras of control and liberalisation

1907: TISCO was setup, first steel production in India
1918: IISC was setup

1948: new Industrial Policy came up. Central government had all powers over new ventures.

1973: SAIL was created as a holding company to oversee govt production

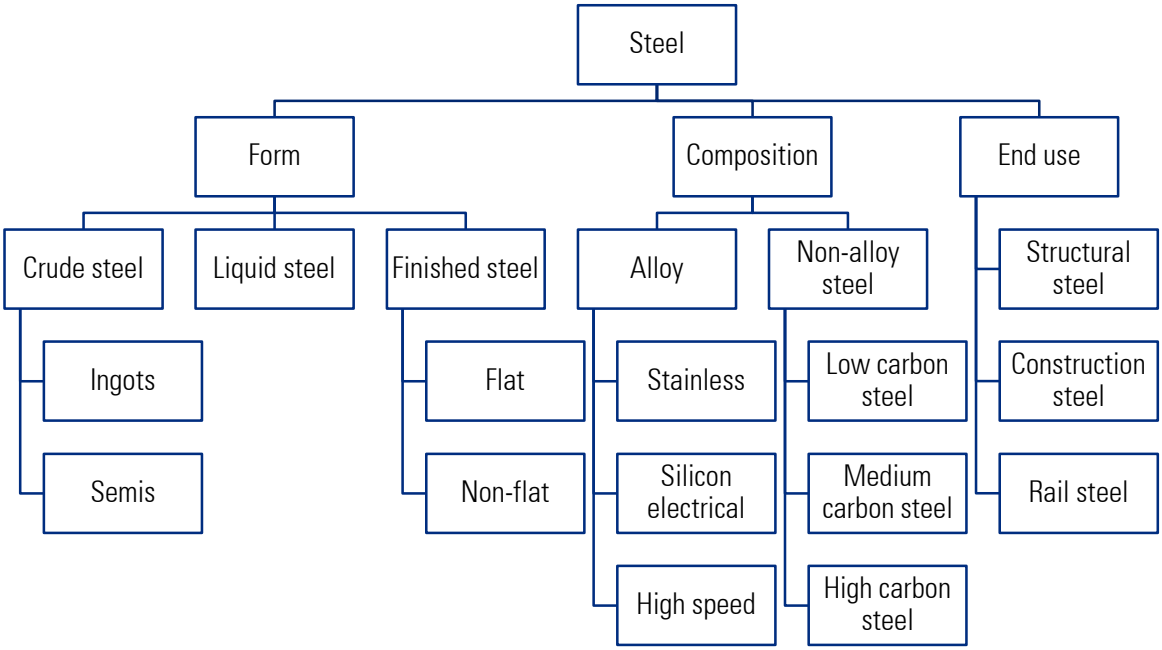
1993: SAIL was partially privatized

1993 – 2012: Decontrol of domestic steel market.

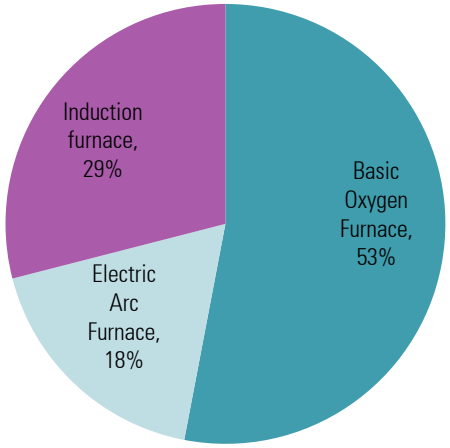
The steel industry is evolving into an efficient industry that adopts modern techniques through policy transformations and shifts in technology

Changing structure of Steel industry

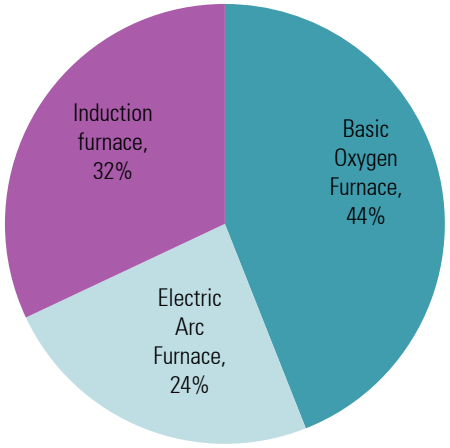
Current structure of Steel sector



TECHNOLOGY: Shift towards steel making through electric route



FY 06

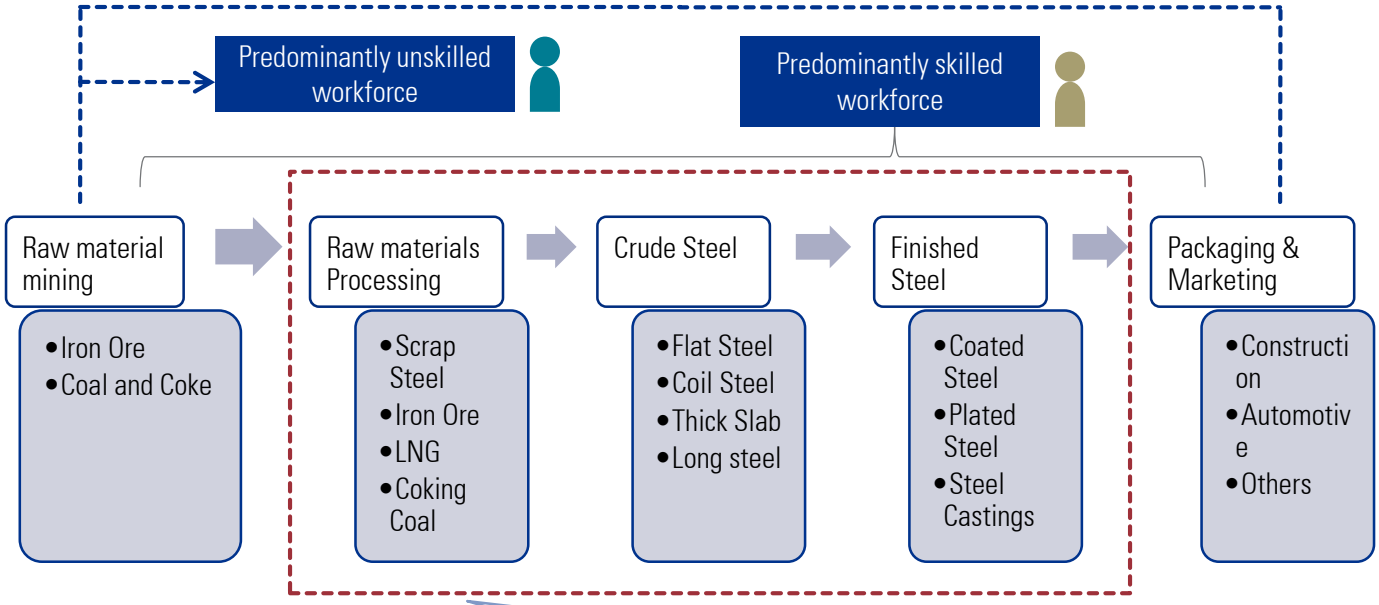


FY 11

Steel production in India attained a high CAGR of 5.8 % during the 11th FYP period 2007-11. This was mostly contributed by growth in steel making through electric furnaces route. While the old method of steel making through oxygen route still remains dominating and contributes to about 44 % of crude steel production in 2011.

Source: Working Group on Twelfth Plan (2011); IBEF Industry Analysis (2013)

Process mechanization and outsourcing of non-core activities expected to realign manpower requirements and labor productivity



Since the emphasis is on enhancing labour productivity, the industry will witness higher degree of mechanisation. Greater process mechanisation would demand manpower realignment, especially at L2 levels

The sector will witness greater focus on core manufacturing activities, whilst raw-material mining, logistics and packaging are expected to become outsourced activities

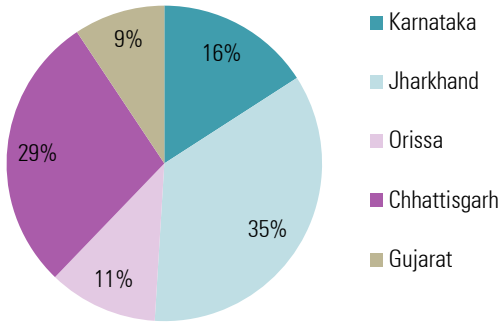
Key data based on ASI 2010-11 and NIC 2008 inputs (values in Rs. Lakh; others in numbers)			
NIC Code ➔	**2410 (Manufacture of basic iron & steel) -**	**2431 (Casting of iron & steel)**	**Total**
Number of factories	5771	3282	9053
Number of employees (organized)	683351	181621	864972
Total Output	47755392	5439412	53194804
Net Value Added	6229351	688906	6918257

Source: KPMG analysis; Stakeholder interactions; NSSO (2011-12); ASI (2010-11); NIC (2008)

Large scale investments towards capacity expansion across the eastern and south-eastern regions

Chhattisgarh	Bhilai Steel Plant	Capacity expansion,	INR 17,266 crores 3.07 MTPA
	Godavari Power and Ispat Ltd	Steel plant establishment	INR 4,500 crores 1 MTPA
Orissa	Posco India	Manufacturing plant, Paradip	INR 52,000 crores 12 MTPA
	Tata Steel Ltd	Greenfield manufacturing plant, Kalinganagar	INR 40,000 crores 6 MTPA
	SAIL	Plant capacity expansion, Rourkela	INR 12,000 crores
Multi state	SAIL	Modernisation and Brownfield expansion plan	INR 72,000 crores
West Bengal	SAIL	Steel plant modernisation, Durgapur	INR 2875 crores 0.52 MTPA
	SAIL	Modernisation of IISCO Plant, Burnpur	INR 16000 crores 2.5 MTPA
Karnataka	SAIL VISP Steel unit	Capacity expansion, Bhadravati	INR 80 crores 0.1 MTPA
Andhra Pradesh	VSP	Production of saleable steel, Vishakapatnam	INR 15,000 crores 3.47 MTPA
	Maa Mahamaya Industries	Sponge Iron Unit, Billets/ Blooms And Rolling Mill, Vijayanagar	Sponge Iron 112,000 TPA Billets/ Blooms 263,200 TPA) Rolled Products 250,000 TPA
	JSW Steel	Expansion of plant capacity, Vijayanagar	INR 6,000 crores 12 MTPA

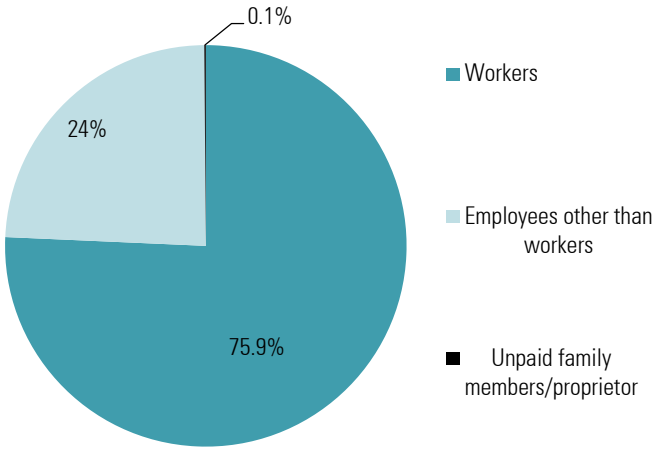
State-wise share of production capacity (MTPA)



Source: Projects India; KPMG analysis; Ministry of Steel Annual Report (2012)

Demographic and workforce characteristics

Workforce Composition- Category of Employment

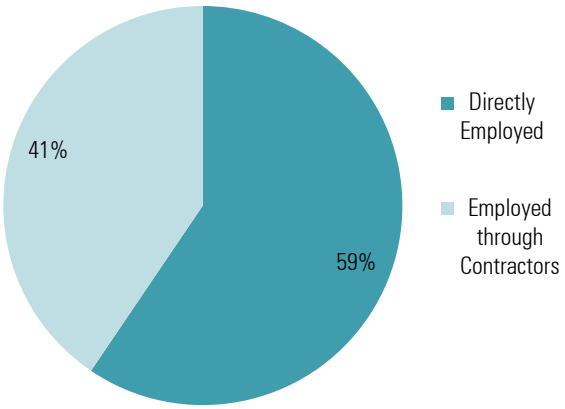


The steel sector is dominated by **workers*** who account for nearly 76% of the total workforce.

Supervisory and managerial level workers constitute 11% of the total workforce comprising Directly employed, employed through contractors, supervisor/Managerial and other employees. Apart from the directly employed, those who are employed through contractors represent the largest (14%) section of the workforce.

Source: ASI 2010-11

Workforce Composition- Direct/Contract



There is a strong presence of **contract workers** in the steel sector, with over 59% of the composition of workers constituting contract workers.

The steel sector is dominated by a **male workforce** constituting 98% of the directly employed workforce

Source: ASI 2010-11

Note: ASI only covers the organised sector and these statistics are representative of that

Most states in India have adopted the Industrial Policy 2009 to encourage and support growth in various state industries

All-India	Liberalisation and the free trade policy has significantly helped growth of steel industry in India. Key initiatives by the central government that supported the growth of the steel industry include: • Freedom to set up integrated steel plants in the private sector; • Placing imports of steel under OGL (open general licence); • Reduction of import duties on both steel and scrap; and • Decontrol of domestic prices Emphasis on infrastructure development as per government regulations is likely to help aid the growth of the steel industry The Ministry of Steel takes up issues facing the Iron and Steel sector in India with other concerned ministries and department such as: • Ministry of Coal: for the allocation of coal blocks and coal linkages to the steel industry • Ministry of Petroleum and Natural Gas: for the supply of Natural Gas to the industry • Indian Investment Policy: stipulates 100% foreign direct investment (FDI) through the automatic route in the Indian steel sector
Jharkhand	**Industrial Policy 2001** Includes capital Investment Incentives, interest subsidies, and employment generation based incentives
Gujarat	**Industrial Policy 2009** Scheme for enhancement of technical competence and manpower Schemes for improving industrial infrastructure **Minerals Policy 2003** aims to enhance efficiency by adopting e-governance, latest techniques in mineral exploration and to create opportunities of local employment **Gujarat Power Policy** Seeks to adopt a rationalized tariff structure
Chhattisgarh	**States Mineral Policy** Aims to create a conducive business environment to attract private investment in the sector. Initiatives taken which would bear relevance to the steel sector include the introduction of new technologies, equipment and R&D facilities to enhance the quality of mineral resources and their uses, and the simplification of mining laws and leases
West Bengal	**State Dispensation Policy of Ministry of Coal**: for the allocation of coal blocks **State Support for Industries Scheme, 2013**: an industry incentive policy which is expected to offer concessions on commercial and value-added taxes, electricity levy and exemption from stamp duty.
Punjab	Power sector reforms, to make the relevant organizational structures of captive power plants more efficient in management, raise resources for augmentation and expansion of the system.

Source: KPMG Analysis

SWOT analysis - Steel industry

Strengths	▪ Abundance of raw materials ▪ Low cost of manpower ▪ Large economy and fast growing population and manufacturing industry is driving demand for steel
Weaknesses	▪ Infrastructural support is inadequate to support the growth potential of steel industry in India ▪ Incorporation of modernised technology and R&D activity are low. As a result, overall production efficiency is low. There has been very little technological development ▪ Operational efficiency is low compared to international leaders ▪ Low coking coal reserves—most of coal is imported. Questionable quality of coking coal ▪ Most iron ore reserves consist of iron ore fines ▪ High taxes and duties ▪ Dependence on imports for steel manufacturing equipments and technology
Opportunities	▪ Potential for export growth (which is currently low) ▪ Rapid increase in domestic demand especially in the urban housing sector ▪ Growth in the rural market likely to continue into the longer term, raising demand for steel ▪ Government's focus on large scale infrastructure investments in the twelfth five year plan and future manufacturing activity growth is likely to drive steel demand ▪ New technologies such as direct iron ore smelting are gaining ground in the manufacturing process ▪ Opportunities to acquire of coal blocks in Asia and Africa
Threats	▪ Rising coking coal prices ▪ The problem of delayed approvals and regulatory clearances will continue being a problem ▪ Land acquisitions and rehabilitation problems ▪ Import penetration and dumping are major threats due to cheaper imports from Japan and China ▪ Obtaining capital for projects and high interest on loans ▪ New technologies such as the Corex process and Hismelt process are power intensive.

Source: KPMG Analysis

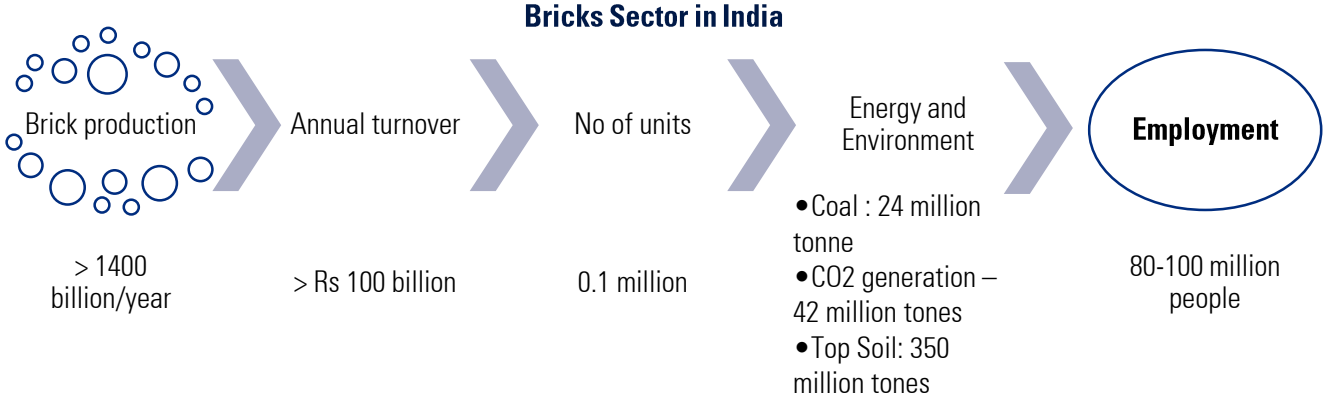
Industry overview- Bricks and refractory material Segment

Second largest manufacturer of bricks in the world with a positive growth outlook due to optimism in rural housing growth

Bricks and refractory materials industry overview

- India is the second largest producer of clay fired bricks in the world next only to China and accounts for more than 10% of the global production.
- Annually more than 140 billion bricks are produced in the country at an estimated consumption of 24 million tonnes of coal. This has resulted in serious environmental deterioration including air pollution and soil erosion
- More than 5000 acres of top layer of soil is dug out annually for manufacturing bricks in the country.
- In India the demand for bricks is continuously on the upward trend due to rapid increase in efforts to boost development of real estate and infrastructure facilities in major towns and cities.
- Increasing housing shortage in the rural and urban segments is expected to increase the demand for bricks in the coming years. According to Assocham, demand for dwelling units in India is likely to reach 90 million in 2010
- The brick production is estimated to be growing at a rate of 4% per year.
- Brick industry consumes about 24 million tones of coal every year, producing about 42 million tones of CO2 every year (4.5% of total emissions from India)

Bricks Sector in India



Demand Drivers

- Strong growth in the construction sector
- Large Demand in urban centers
- Population growth and rapid urbanisation
- Growing demand for housing

Strong linkages with Construction sector

- The only exogenous factors that can affect the growth of the bricks industry are the growth prospects of the construction and infrastructure sectors
- Demand is derived and contingent on performance of construction sector
- Use of AAC and RC bricks becoming popular

Bricks Outlook

Greener Technology adoption

- In order to reduce emissions, Government is promoting use of resource efficient bricks and improving the overall efficiency in brick making

Policy Environment

- Though the policy environment has not been completely favorable for the brick making business, stringent norms on use of fly ash in brick making and upgrading to new technologies has opened new venues of opportunity for players in the sector

Source: KPMG in India analysis, TERI (2007)

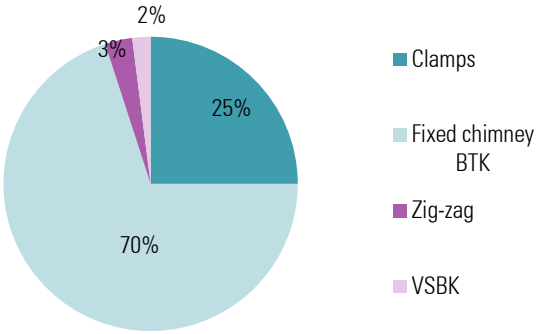
Two factors largely contribute to the changing structure of the bricks industry—AAC and RC bricks increasingly substituting traditional red bricks and technological up-gradation of brick kilns

PRODUCT

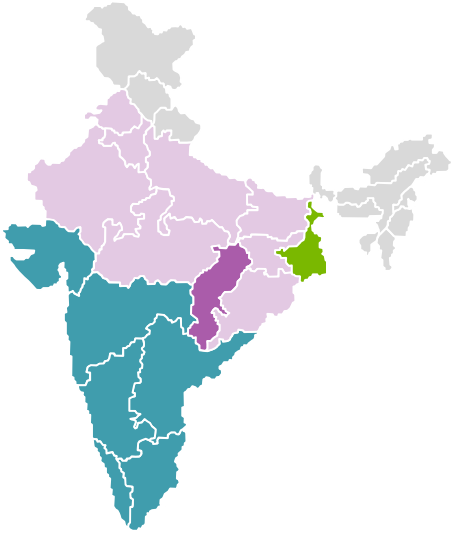
- The use of AAC and RC bricks instead of the traditional red bricks is gaining popularity. Production of AAC blocks and RC bricks is a mechanised process that is 50 times more efficient and enhances labour productivity by 2.5 times as compared to traditional brick kilns

TECHNOLOGY

- Brick production in India takes place in small units using traditional firing technologies and manual labor. The main production output of solid bricks is manufactured through manual moulding.
- The most prevalent brick kiln technology in India is **Fixed Chimney Bull's Trench Kiln** (FCBTK) technology of firing bricks. Almost 70% of the total bricks produced in India is based on this technology.



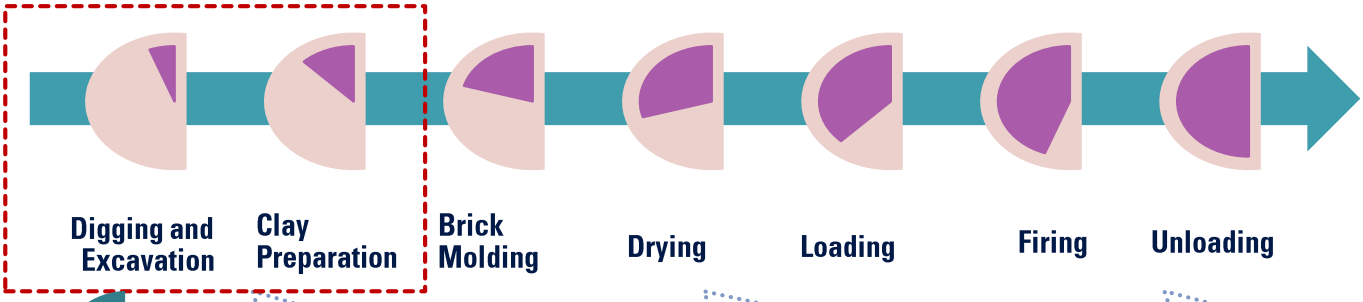
Clamps	• Central, West and Southern India
Fixed chimney BTK	• Indo-Gangetic plains (North and East India) and several clusters in South and West India
Zig-zag	• West Bengal and a few clusters in North India
VSBK	• Central India



Rough indication

Source: Green tech Knowledge Solutions Analysis; Stakeholder interactions

The production process is predominantly unorganised and non-mechanised through most part of the value chain. Greater mechanisation is envisaged in the coming years



Clay preparation forms an important step in the brick making process. Laborers employed are selectively trained to mine clay and store in a open environment and mix it with water to bring the right consistency

Post tempering, the clay is carefully rolled manually by hand/ rolling it in the sand using metal mould.
Proper care is taken so that the shapes of all bricks are the same by brick checker in the manufacturing unit.
Post molding, bricks are left for drying in the sun for days until they are ready to be burnt

The bricks are loaded onto a kiln and are perfectly heated at a preset temperature for a week to bring out the rigidness of the clay in the brick.
Firing requires special skill sets and its effectiveness mainly depends on the knowledge and experience of the brick maker

The industry will witness a transformation of the value chain, especially at the procurement of raw-materials stage. The industry expects a substitution of traditional red bricks with AAC blocks, fly-ash bricks and reinforced concrete blocks. This replacement is expected due to multiple reasons—government regulation of sand mining, perceived environmental sustainability of fly-ash bricks over traditional red bricks, more efficient and mechanized manufacturing processes
This substitution will result in replacement of digging, excavation and clay preparation with chemical and manufacturing-oriented processes in this stage of the value chain.

Key data based on ASI 2010-11 and NIC 2008 inputs (values in INR ten billion; others in numbers)

NIC Code →	2391: Manufacture of refractory products	2392: Manufacture of clay building materials	Total
Number of factories	1205	8037	9242
Number of employees (organized)	47291	298968	346259
Total Output	981987	818508	1800495
Net Value Added	213235	219681	432916

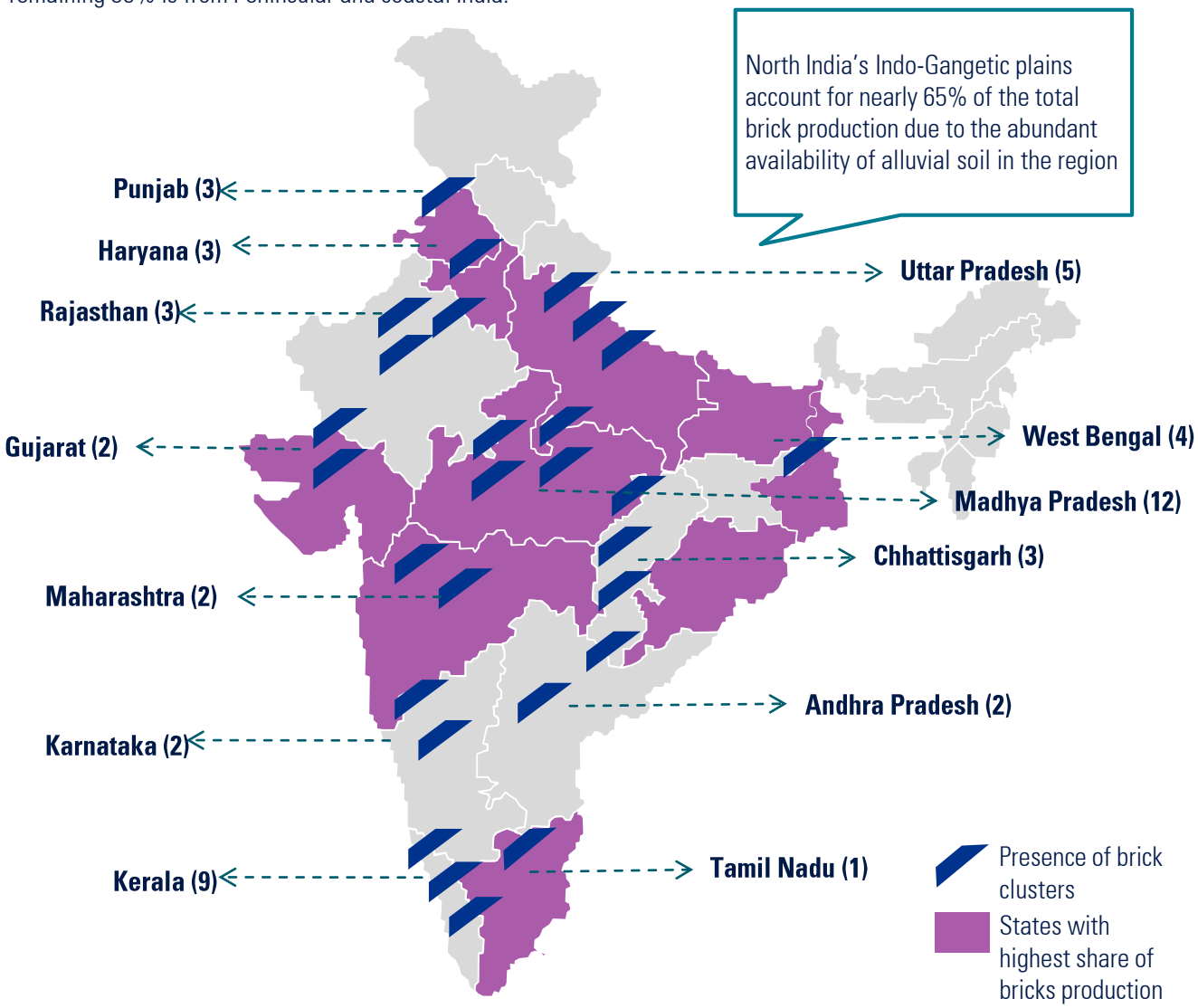
Source: KPMG in India analysis; Stakeholder interactions; ASI (2010-2011)

Large demand in urban regions has led to the formation of several brick kiln clusters in the outskirts of major towns and cities

Based on the type and availability of soil used for brick making, India is segmented into three broad regions:

1. Northern Mountainous region,
2. Indo- Gangetic plains and
3. Peninsular region

Due to the latteric nature of Peninsular soil and coarse nature of the Mountainous soil, the presence of brick making units in both the regions is limited. Alluvial nature of the soil in the Indo-Gangetic plains is considered most suitable for brick manufacturing. Therefore the Gangetic Plains of North India account for about 65% of total brick production and the remaining 35% is from Peninsular and coastal India.



North India has been a strong manufacturing base for clay bricks owing to the abundant availability of good quality clay .However due to scarce availability of good quality clay in South India, other brick walling material such as cement blocks/fly ash bricks are manufactured.

Source: KPMG in India analysis, Clusterobservatory.in

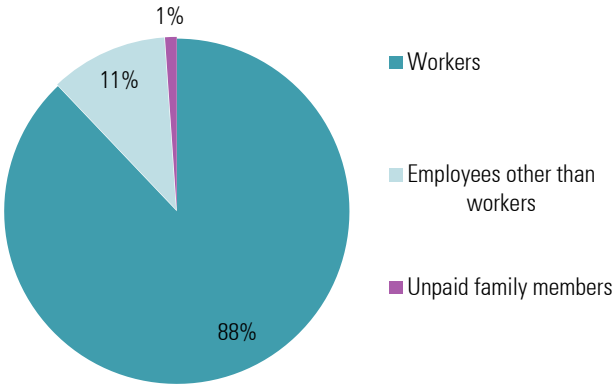
Demographics and Workforce Characteristics

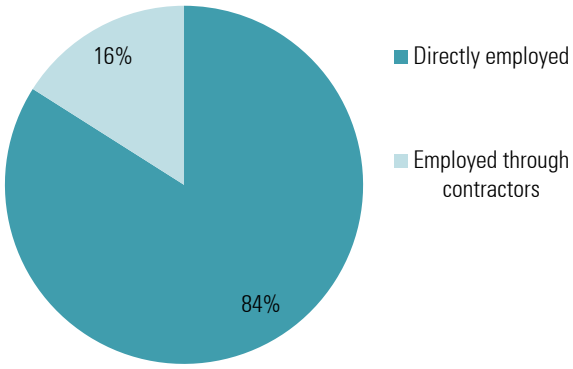
Brick kilns in India are highly labour intensive due to lower levels of mechanisation. India is estimated to have more than 100,000 brick kilns employing around **10 million** individuals

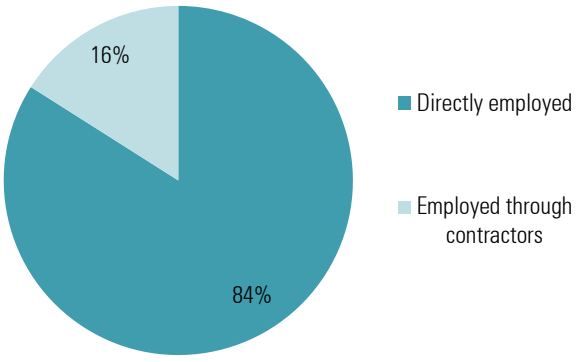
Highly Fragmented and Unorganised workforce:

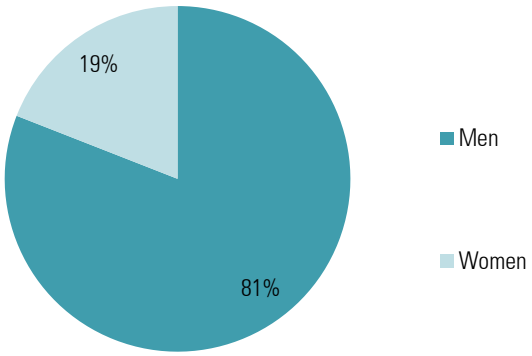
- The industry is highly fragmented and employs a larger section of workers in the unorganised sector and provides only for seasonal employment
- The working environment standard is poor, with low wage rates and long working hours
- Due to the seasonal nature of the brick production process, the brick kilns are normally shutdown during monsoon, leading to temporary unemployment of a large number of unskilled workers in the industry
- The workers in the industry are migratory in nature and mostly emerge from the backward and poor regions of the country. The industry is also one of the significant employers of women and children

Distribution of workforce according to ASI (2011)









Source: KPMG in India analysis; TERI; ASI (2011)

Central and State-level policy initiatives need to focus

Despite its significance in the growth of construction industry in India, the bricks making sector has received very less attention in terms of Policy actions and Development initiatives. Some of the major initiatives that resulted in shifting the sector from a large polluting sector to a less polluting sector by mandating up-gradation of brick kiln firing technologies from from moving chimney bull trench kilns to fixed chimney bull trench kilns.

Key interventions from the Government for the bricks making sector:

Agency/ Programme	Type of Intervention
Central Building Research Institute, Government of India	Introduction of zig-zag firing technology and semi-mechanization process(1970s)
Central Pollution Control Board/ Ministry of Environment and Forest	Air emission regulation for brick kilns (1990s)
Swiss Agency for Development and Cooperation	Introduction of Vertical Shaft Brick Kiln (VSBK) Technology (1995-2004)
United Nations Development Program - Global Environment Facility (UNDP-GEF)	Introduction of hollow bricks and other resource-efficient bricks.(2009-ongoing)

Central Level Initiatives

Considering the environmental benefits and cost advantage of using Resource Efficient Bricks (REBs) in place of traditional clay bricks, the Government has been taking proactive steps to increase the adoption of environmentally friendly and energy efficient practise in the manufacture of building materials. Some of the main policy initiatives that has created a way forward are mentioned below.

Policy Action	Purpose
Sustainable Habitat Mission under the National Action Plan on Climate Change (NAPCC)	Mission calls for energy savings in buildings by making energy-saving building codes mandatory in three years for new commercial buildings
Energy Conservation Building Code (ECBC)	Ensures construction of energy efficient building with a concomitant reduction in electrical demand.
Green Rating system for buildings GRIHA (Green Rating for Integrated Habitat Assessment)	Aims to strike out a balance between development and environment preservation

Source: KPMG analysis, Greentech Knowledge Solutions Analysis

SWOT analysis

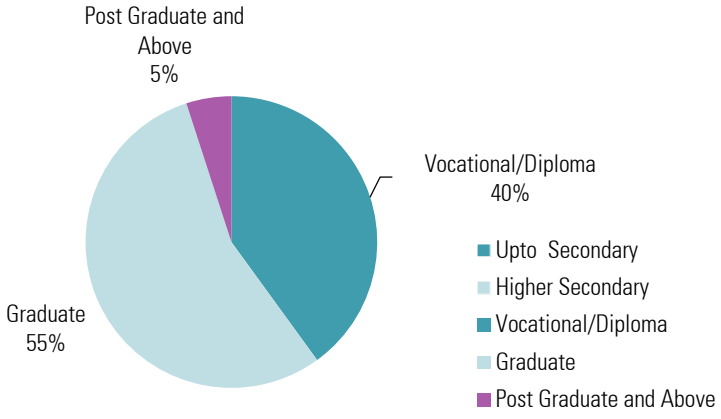
Strengths	▪ Serves as a key component for construction sector ▪ India is the second largest producer of clay fired bricks in the world ▪ Most important walling material ▪ Employs around 100 million workers
Weaknesses	▪ Labour rates are highly fluctuating due to seasonal availability of labour force ▪ Majority of brick kiln owners/makers lack practical knowledge and skills on energy conservation measures ▪ Lack of proper financing platform to enable brick kiln owners to invest in construction of new facilities and machinery ▪ Brick kiln units have less or no access to electricity as they are located in remote areas, thereby making shift to semi-mechanization difficult ▪ Low profit margin for machine moulded bricks due to very high production costs and stiff competition from low priced manually made bricks ▪ Production process is highly energy intensive and has a large environmental footprint
Opportunities	▪ Increasing demand for housing, especially in rural areas ▪ Rapid increase in efforts to boost development of real estate and infrastructure facilities in major towns and cities ▪ Availability of advanced brick manufacturing technologies ▪ There is a structural transition from red bricks to AAC, RC blocks and fly ash bricks that are identified as more sustainable and witnessed larger organised participation
Threats	▪ Severe shortage of workforce ▪ Fuel prices are rapidly increasing, posing a severe threat for small brick kiln manufacturers

Incremental human resource requirement (2013-17, 2017-22) and skill gaps

Skill gap analysis in the sector

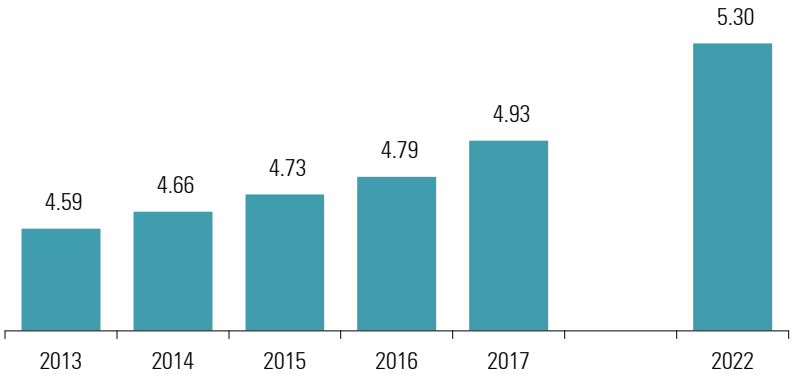
Demand for multi-skilled employees	▪ Middle level job roles will require equipping employees with skills across the value chain ▪ The case will especially be prevalent in the cement and steel sectors, where the current and expected trend is that of optimising labour costs given the modest industry outlook forecast for the next 3-4 years... BE SPECIFIC
Ability to adopt new technologies	▪ There is a growing emphasis to adopt energy-efficient manufacturing process technologies, across the resource-intensive sub-sectors ▪ The trend towards increased process mechanisation demands knowledge of simulation-based management of manufacturing processes, especially at the middle level ▪ Technological up-gradation of workforce requires strong linkages between investment in R&D and the training curriculum
Greater emphasis on sector specific skills	▪ Sector specific training will be required going forward. Currently, it is a given for industry to invest in its new recruitments to prepare them for the relevant jobs ▪ For instance, the cement industry puts its fresh recruits through graduate training programs, in order to transform them from merely being engineers to 'cement engineers'.
Availability and retention of manpower	▪ Location of production facilities in remote areas and labor intensive manufacturing processes pose a challenge to retain manpower, especially at the supervisory and management levels ▪ Attrition rates are around 8-10% ▪ Most of the manpower shifts to sectors such as IT services and Retail
Lack of standardization in training	▪ Most of the training is industry-led. Thus, training quality is a function of organisations that provide in-house training. ▪ There is no mechanism to compare or rank the quality of training infrastructure available, posing challenges to identify the skill gaps at a sector level
Need for a sector-level nodal agency	▪ Lack of an exclusive Sector Skill Council proves to be a challenge towards addressing the skill gap issues in the sector, comprehensively. ▪ While the reasonably organised cement and steel industry players have the resources to provide captive training infrastructure, highly unorganised sectors such as the bricks industry faces a tremendous challenge in identifying the technological needs, skills gaps and overcoming them ▪ Since training is predominantly industry-led, the absence of a nodal agency to overlook quality, compliance and accreditation poses a challenge

Split of workforce requirement by education*



*Based on sub-sector wise industry inputs considering the historic trends in recruitments

Workforce Projection in 2013-22 (in lakhs)



Source: Primary Interactions, KPMG Analysis

The cement sub-sector currently employs ~0.45 million employees which is expected to increase in the nine year period 2013-22 to ~0.53 million.

Skill requirements across key functions

Function	Key Job Roles	Key Skills Required
Mining and Quarrying	Mine and Quarry labourers, Quarryman, Mining Engineer-non-metal, Mining and metallurgical Technician, Mine and Quarry Managers, Mining and Quarrying Supervisor and Foreman Conveyor Operator	▪ Extraction of solid minerals from underground, surface mines or quarries ▪ Some work is carried out by hand , but greater mechanisation of extraction processes has shifted the demand to operation and management of these machines. Plant operators operate and monitor plant for cutting channels in a mine workface, for processing mineral ore ▪ Management and transportation of raw-materials from mine/quarry to production plant ▪ Understanding of the work organisation, the materials and tools used, and the nature and purpose of the final product.
Manufacturing (includes grinding and storage of raw-materials, firing of raw-materials/ clinkerisation, clinker milling and cement grinding)	Manufacturing Manager, Process Instrumentation and Controls Engineer, Chemical Engineer, Chemical Engineering Technician, Mechanical Engineer- Production, Quality Assurance Manager, Production and Operations Department Manager in Construction, Supervisor and Foreman, Mineral Treating Mill Wright, Maintenance Engineer, Crusher Operator, Crusher Attendant, Plant Operator, Cementer, Plant Operator, Furnace Operator, Machine Operators and assemblers, Burner (Cement), Kilnman (Cement), Chemical Roaster Granulator Attendant, Nodulizer Man, Mixer, Gauger (Cement)	▪ Knowledge of various chemical processes in cement manufacturing ▪ Accurately operating controls in the control room so as to ensure the required production ▪ Sound understanding of different clinker production processes ▪ Knowledge of up-to-date processes and quality improvement practices ▪ Ability to conduct accurate quality control functions ▪ Adapting to the increased use of machinery and automation in the cement manufacturing process (i.e. control of manufacturing processes, automated sampling techniques, spillages from control rooms, loading and unloading etc.) ▪ Organising calibration of process and lab instruments ▪ Maintenance of sensors, transducers, control panels so as to keep them ioperating condition at all times ▪ Ensuring safe and appropriate storage of materials ▪ Working with cement processes, pyro and grinding processes, mills and kiln operation, raw-materials management and process optimisation. ▪ Maintenance of various aspects of cement plants (i.e. Mills, rotary kilns, etc.)
Storage, packaging and despatch	Operators and Loaders, Storage and Warehousing Manager Packaging and Engineer Sorting, Packaging and Despatch Supervisor and Foreman	▪ Knowledge of cement packing processes and ability to properly use packing machinery ▪ Management of logistics and efficient transportation of cement to market in the most cost-effective way

Source: KPMG Analysis; Stakeholder interactions

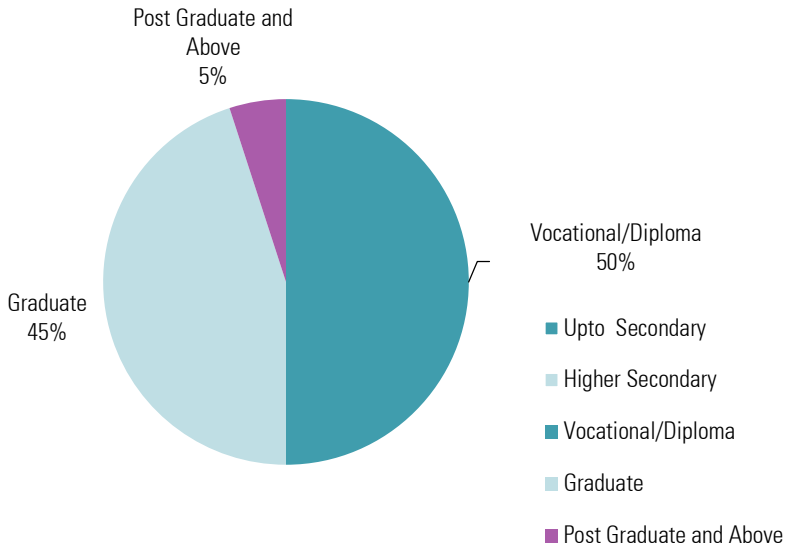
Changing Skill Requirements

Changing skill set requirements		
Levels	**Skills required**	**Skill gaps**
Entry level Machine Operators, Mining and Plant Workers	Ability to use simple hand held tools and invest considerable physical effort	Increasing mechanization of production processes will require workers to adapt to a highly mechanised and computerized manufacturing environment
	Ability to work with machines in a labour-intensive factory environment	
	Understand the production process	
Middle level Supervisors and Foreman, Engineers, Quality Control Technicians and Managers, Plant Operators	Supervision of various machining and grinding operations and ensuring production to required specifications	There is a mismatch in industry requirements and the education provided, compelling the cement industry to develop captive training to make its recruits industry-ready. The changing structure of the cement industry, in terms of technology and processes, will demand plant operators and supervisors to adapt to the changes. L2 level employees will be required to adopt multiple skills across the value chain to cope with the changing production processes. The industry needs to enhance its research and development capabilities. This will require investment in building the research capabilities and creation of research-oriented job roles
	Monitor quality of production and end-product	
	Management of production processes and coordination with management aspirations	
	Operation and monitoring of extrusion, moulding, mixing, grinding and cutting machines which manufacture and finish various pre-cast concrete and stone products, or which make cast stone for building purposes	
Top level (Director, Managers, Business Heads)	Develop growth strategy for the organisation	Emphasis at the leadership level is to build their soft-skills and acquaint them with technology up-gradation
	Coordinate production constraints and management aspirations	
	Influencing policies that will impact industry growth	

Source: NCO (2004), Stakeholder interactions, KPMG analysis

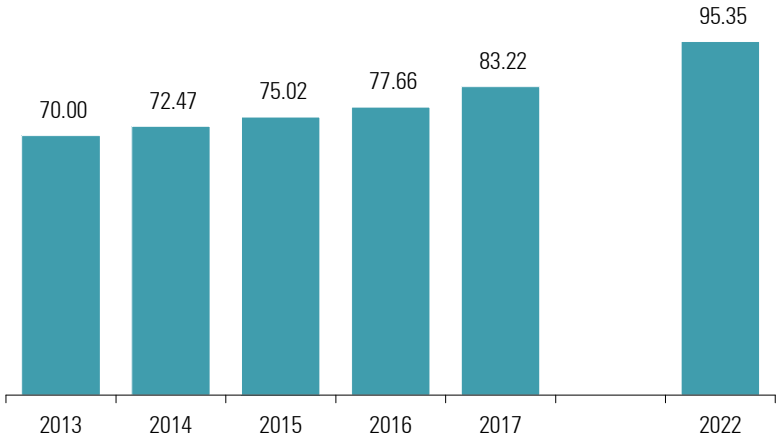
Bricks, Mortar, Stones & Other Refractory Materials

Split of workforce requirement by education*



*Based on sub-sector wise industry inputs considering the historic trends in recruitments

Workforce Projection in 2013-22 (in lakhs)



Source: Primary Interactions, KPMG Analysis

The bricks, mortar, stone and other materials retailing sub-sector currently employs ~7 million employees which is expected to increase in the nine year period 2013-22 to ~9.5 million.

Skill requirements across key functions

Function	Key Job Roles	Key Skills Required
Digging and Exploration	Mine and Quarry labourers, Quarryman, Foreman Freight Lifters/Handlers Mining Operators	▪ Extract china clay, lime stone, fire clay and other non metal deposits from quarry by cutting breaking etc. ▪ Should be specialized to simple mining tools ▪ Management and transportation of raw-materials from mine/quarry to kilns
Production (includes clay preparation, brick moulding and drying, loading and firing)	Clay Feeder Brick Kiln Operators Mechanics Machine Operator Firemen Foreman Loaders Brick Checker Brick Sorter Plant Manger Supervisor Hand Brick Moulder	**Brick Checker** ▪ Makes routine examination of bricks for quality, shape, size or functioning, visually or by means of measuring aids or by simple operation with testing apparatus **Brick Sorter** ▪ Sorts burned bricks according to color (shade), hardness and quality ▪ This task requires an understanding of examining the products visually for color, hardness and shape by tapping with finger or wooden rod or by quality of sound **Hand Brick Molder** ▪ Molds by hand bricks or tiles of various shapes and sizes using appropriate molds
Storage, Unloading and despatch	Operators and Loaders, Packaging and Despatch Supervisor Sales Manager Driver	▪ Knowledge of brick packing and despatch processes and ability to properly use packing machinery and efficiently despatch to markets

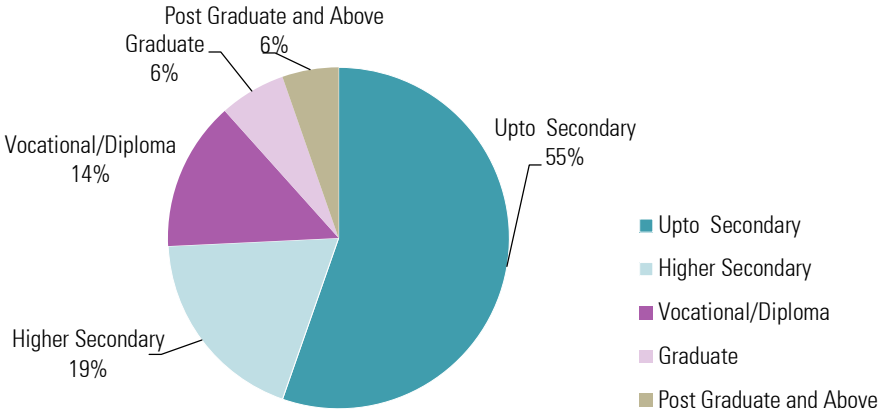
Changing Skill Requirements

Changing skill set requirements		
	Skills required	**Skill gap**
Entry level Quarrymen, clay feeder, hand brick moulder	Ability to use simple hand held tools and invest considerable physical effort	Lack of technical know-how among laborers Inability to work without supervision
	Ability to undertake repetitive work in a labour-intensive environment	
	Understand the production process	
Middle level Supervisors, Brick Kiln Operators, brick checkers, brick sorter	Monitor quality of production and end-product	Lack of experienced professionals with advanced knowledge on mechanized processes
	Management of production processes	
	Operation and monitoring of entire manufacturing process	
	Maintenance and supervision of kilns	
Top level Director, Managers	Develop growth strategy for the organization	Lack of advanced technical know-how to cope with technological advancements in the sector
	Ability to create strategies to cope with a technologically dynamic environment	

Source: Primary industry interactions, KPMG in India analysis

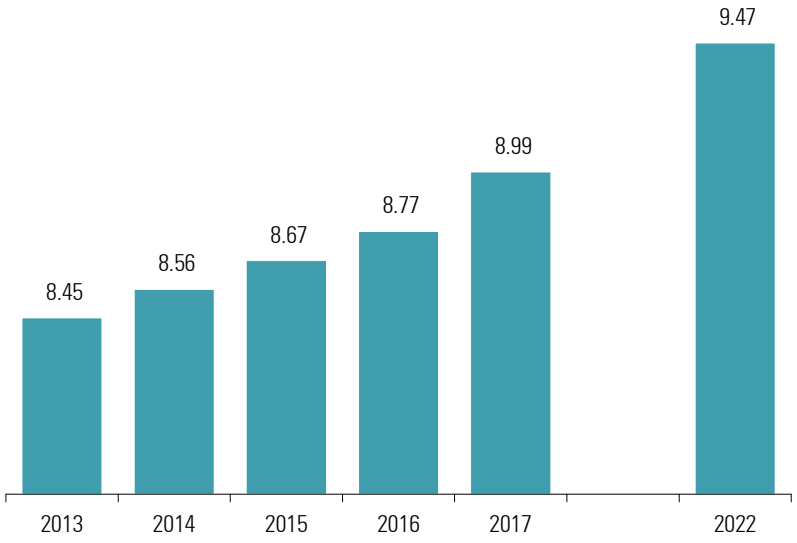
Iron and Steel

Split of workforce requirement by education*



*Based on sub-sector wise industry inputs considering the historic trends in recruitments

Workforce Projection in 2013-22 (in lakhs)



Source: Primary Interactions, KPMG Analysis

The iron and steel sub-sector currently employs ~0.8 million employees which is expected to increase in the nine year period 2013-22 to ~0.95 million.

Skill requirements across key functions

Function	Key Job Roles	Key Skills Required
Mining and Quarrying	Mine and Quarry labourers, Metal Mining Engineer, Mining and metallurgical Technician, Mine and Quarry Managers, Mining and Quarrying Supervisor and Foreman, Mining Plant operator, Mining HEMM operators, Blast Furnace operator Conveyor Operator Mechanic, Mining machinery Convertor Blower Ore and metal furnace operators, Slag flusher, Blasting in-charge	▪ Extraction of solid minerals from underground, surface mines or quarries ▪ Some work is carried out by hand , but greater mechanisation of extraction processes has shifted the demand to operation and management of these machines. Plant operators operate and monitor plant for cutting channels in a mine workface, for processing mineral ore ▪ Management and transportation of raw-materials from mine/quarry to production plant ▪ The tasks call for an understanding of the work organisation, the materials and tools used, and the nature and purpose of the final product. ▪ Soft skills including punctuality and ethics ▪ Supervisors require strong human resource management skills
Manufacturing (includes grinding and storage of raw-materials, Firing of raw-materials/ clinkerisation, clinker milling and cement grinding)	Metal engineer, Mechanical Engineer- Production, Production mechanical engineer, Safety engineer, Planning & Production manager, Facility manager, Materials management Manufacturing Manager, Process Instrumentation and Quality Assurance Manager, Production and Operations Department Manager in Construction, Plant Operator, Machine Operators and assemblers, Supervisor and Foreman, Mineral Treating Material Scientist Mineral and Ore Grinder Supervisor & foreman	▪ Knowledge of various processes in steel manufacturing ▪ Accurately operating controls in the control room so as to ensure the required production ▪ Knowledge of up-to-date processes and quality improvement practices ▪ Ability to conduct accurate quality control functions ▪ Organising calibration of process and lab instruments ▪ Maintenance of sensors, transducers, control panels so as to keep them in operating condition at all times ▪ Maintenance of various aspects of the plant ▪ Active participation in supervising the facility mgmt of the plant and surroundings ▪ At the manufacturing level, the supervisory level roles must ensure that a certain level of labour productivity is maintained ▪ Soft skills involving manpower management are required
Storage, packaging and despatch	Machine Operators, Engineers for Storage and Warehousing Packaging and Despatch labourers Supervisor and Foreman	▪ Knowledge of and ability to properly use HE ▪ Ability to effectively brand and market the product ▪ Management of warehouses, sheds, material yard for timely delivery and off-takes

Changing Skill Requirements

Changing skill set requirements		
	Skills required	**Skill gap**
Entry level (Machine Operators, Mining and Plant Workers,	Ability to operate HEMM safely and invest considerable physical effort	Increasing mechanization of production processes will require workers to adapt to a highly mechanised and computerized manufacturing environment
	Ability to work with teams towards completion of targets in shift operations	
	Understand the production process	
Middle level Supervisors and Foreman, Engineers, Quality Control Technicians)	Supervision of various machining and grinding operations and ensuring production to required specifications	▪ There is a mismatch in industry requirements and the education provided, compelling the steel industry to develop captive training to make its recruits industry-ready. ▪ L2 level employees will be required to adopt multiple skills across the value chain to cope with the changing production processes. ▪ The industry needs to enhance its research and development capabilities. This will require investment in building the research capabilities and creation of research-oriented job roles
	Monitor quality of production and end-product	
	Management of processes feeding into production– e.g. handling of coking coal, limestone, iron ore and fines	
	Operation and monitoring of extrusion, moulding, mixing, grinding and cutting	
Top level (Director, Managers, Business Heads)	Develop growth strategy for the organisation	Emphasis at the leadership level is to build their soft-skills and acquaint them with technology up-gradation
	Influencing policies that will impact the industry	

Source: Primary industry interactions, KPMG in India analysis

Key challenges

Sub-sector/ Segment – where growth and skill are not in line

- Mismatch exists predominantly amongst entry-level through to mid-management level
- This is largely due to the mismatch in the pace of mechanisation and technology upgradation against pace of training
- Pace of training is not in line with degree of mechanization and technological up-gradation. This mismatch will create a skill gap in entry- through mid-management levels

Skills premium – correlation to increasing wages

- Most of the entry level training entails 3-5 years of on the job experience of different segments of the cement plant before being industry-ready
- Besides captive training facilities set up by select large players, there are limited training facilities and limited classroom inputs
- The human resource strategy is to enhance skilling of existing labour force through industry training facilities
- There is a skills premium for trained workforce, however the numbers as on date are highly limited

Variation in standards of training

- Training quality is a function of organisations that provide in-house training.
- Few recruitments happen through ITI's, however employability is fairly low, and all such candidates go through specific training programs
- Given the current variations in quality of training, it does not ensure either standard job roles or pay for the trained candidates.

Issues and challenges faced

- Very little mobility across various production components in the value chain
- Production facilities are moving to remote areas given availability of land, access to resources and costs. This has led to a fairly unaware and unskilled pool of laborers in the catchment areas
- Further skilled resources from urban/ peri urban areas are reluctant to migrate in to rural/ deep rural India
- Mechanization of processes have led to erosion of technical skills, reducing interest of candidates

Issue of attrition

- Tough working conditions and location of production plants in remote areas has resulted in attrition levels around 8% among L2 level employees, who usually shift to more lucrative industries such as IT services and Retail.

Key challenges

Sub-sector/ Segment – where growth and skill are not in line

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Training curriculum

- Going forward multi-skilling across various production functions will be the trend
- Most entry-level recruits possess limited industry-relevant skills and it is taken for granted that any fresh recruit is provided on-the-job training for 6 months on an average
- Emphasis on computer simulation based production processes and nanotechnology implies skill up-gradation of existing workforce
- Curriculum development is industry-led. Greater investment in R&D for efficient and sustainable manufacturing practices that can manifest as transferable skills is required.

Current sourcing of manpower

- Greater process mechanisation implies that the industry expects even its L1 employees to at least be sourced from an ITI or polytechnic
- However, given limited supply, most manpower is sourced from the industry's own captive training facilities
- Contract workers are generally sourced from local areas neighbouring the plants
- Industry demand for fresh human resource is limited. The strategy is to enhance the skills of the existing human resource

Training delivery mechanisms

- Entry level training entails on the job experience in different segments of the cement plant before being industry-ready
- Most of the training is on the job with little classroom inputs
- Apart from on-the-job training, that is usually on-site, use e-learning techniques to connect industry, training partners and potential trainees, in order to make training opportunities more accessible.

Labor Productivity

- Labor productivity is likely to increase due to greater process mechanisation
- Demand for low-skilled laborers will decrease due to replacement by technological processes

Training Infrastructure

Training infrastructure

Available training infrastructure is largely defined by the industry and its in-house training provisions

Cement manufacturing is increasingly **mechanised** and **computer simulation oriented**. There is also an impetus towards the promotion of nanotechnology-based production methodologies. This demands the creation of new job roles and increased skill sets in order to match the changing characteristics of production as well as in order to cope with the production capacity expansion of 150 MT expected during the Twelfth Plan period.

Building Materials and Technology Promotion Council, New Delhi	
So far, more than 800 construction professionals and 2000 masons, bar benders, plumbers, artisans have been imparted hands-on training.	Sustainable Construction and Green Construction Practices; Earthquake Resistant Design and Construction; Concrete Mix - Design and Quality Control; Water Proofing and Damp Proofing; Quality Control and Assurance in Construction; Use of Chemical and Mineral Admixtures for Concrete Construction; Repair, Maintenance & Rehabilitation of Buildings including Seismic etrofitting Use of Bamboo in Building and Housing Construction
Dalmia Institute for Scientific and Industrial Research, Rajgangpur, Orissa	
Testing and evaluation of refractory related raw materials, intermediate and finished products and their application in different industries, Human Resources Management, TQM, ISO and Application of IT to refractory industries. (6 weeks)	Engineer, Production Manager, QC/R&D Manager, Chemists and Supervisors working in Manufacture or use of Ceramic and Refractory Materials of Colombo Plan Countries
Application of refractory products in different industries, financial, personnel and Human Resources management, TQM, TOC, IT, ISO:- scope, application and benefits to refractory industries (2 weeks)	Production manager, Engineer, Marketing Manager, R&D/QC Manager, Supervisors and middle decision makers of Colombo Plan Countries
J. K. Cements Training Institute, Nimbahera, Rajasthan	
The training centre is equipped with modern training aids and caters to competency development needs of more than 25 cement plants of northern India. It sources students from Rajasthan and other states	Training is also provided to workers from other cement plants Advanced Skill building training for workers with 5-10 years of experience
Short term courses: 3-5 days; Long term courses: 1-12 weeks	
National Council on Cement and Building Materials, Hyderabad and Ballabhgarh	
Recommended to be the national nodal for skill development in the cement industry. It is the only organisation that caters to training entry level as well as working professionals.	Certificate courses in individual areas of cement technology for 2-3 months; Computer based training programmes for operators and technicians; Distance Learning Programme - one year Post Graduate Diploma in cement technology; Refresher courses on specific subject of cement manufacturing of 5 to 30 days

Source: KPMG Analysis; Stakeholder interactions

Recommendations for Stakeholders

Recommendations for Stakeholders

Strengthening the training framework to match the changing industry requirements

- Training providers are primarily unregulated, lack quality, teach an outdated curriculum and are ill-equipped to handle demands of the industry
- The training infrastructure is predominantly industry-led and unorganized—no single body gives accreditation. Therefore, training quality is a function of organizations that provide in-house training

Recommendation 1: Strengthening the training framework to match the changing industry requirements

- Training infrastructure should be standardised and comparable across providers
- Coordination between stakeholders in order to identify the skill gaps and appropriate mechanisms to deal with them
- Licensing of providers will help in monitoring compliance, regulation and accreditation of training

Institutional measures to have relevant checks for monitoring of agencies

- Establishment of an exclusive sector skill council for the Construction Materials and Building Hardware sector to ensure the coherent and comprehensive addressal of the skills gaps of the sector as a whole

Recommendation 2: Institutional measures to have relevant checks for monitoring of agencies

- Creation of a nodal agency to monitor the training ecosystem in the sector is crucial to standardise the training and evaluate its quality
- This will require consultation between the industry, training providers and potential trainees

Development of training curriculum to align the skill set imparted along with industry requirements

- The curriculum should be sector specific and must simultaneously equip the trainee with multiple skills across the industry value chain
- Training providers should educate on relevant and updated technology such as computer-simulation and dry process calcination in cement manufacturing, the Corex process, The Hismelt process, Direct iron ore smelting for steel production and the Fixed Chimney Bull's Trench Kiln (FCBTK) technology for firing bricks

Recommendation 3: Training curriculum development to align the skill set imparted along with industry requirements

- Existing workforce should be awarded certification by RPL in order to ensure effective delivery of appropriate training for appropriate levels

Construction Materials and Building Hardware sector is not looked upon for Career Prospects

- Training centres should be established close to manufacturing plants to mitigate the problem of location-related attrition
- A framework to recognise and incorporate the informal workforce into the training infrastructure is required

Recommendation 4: Enhance attractiveness of the sector

- Skill premium should be given to up skilled workforce
- Government must encourage such courses as an option in popular ITI institutes

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