



Coal's Role in the Cement Industry

Christian Dueweke
LafargeHolcim

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LafargeHolcim Global Overview



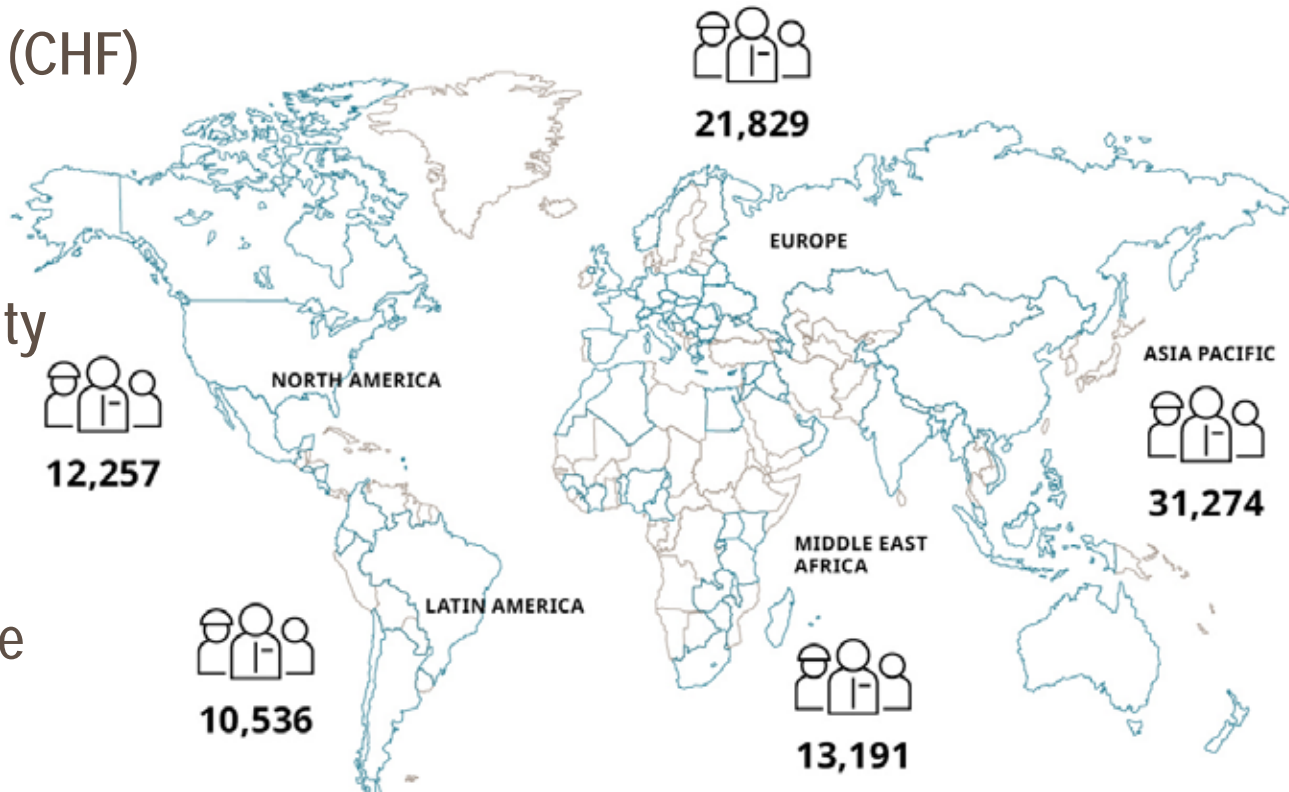
Headquartered in Switzerland
90,000 + Employees
Operate in 80+ Countries
\$26.9 Billion in Net Sales (CHF)



Over 200 Cement Plants
353.3 Million Tons Capacity



Over 2,300 Plants/sites
1,400 Ready mix concrete
600 Aggregate Sites
200 Cement Plants



LafargeHolcim global presence (highlighted in Blue) as of 12/31/2016. Figures reflect the number of employees in each region.

U.S. at a Glance



Headquartered in Chicago IL

7,000+ employees

Operate across 43 states



13 cement plants

~20 Million tons Cement Capacity

105 cement/fly ash terminals

2 slag facilities



98 aggregate sites + 18 docks

121 ready mix sites

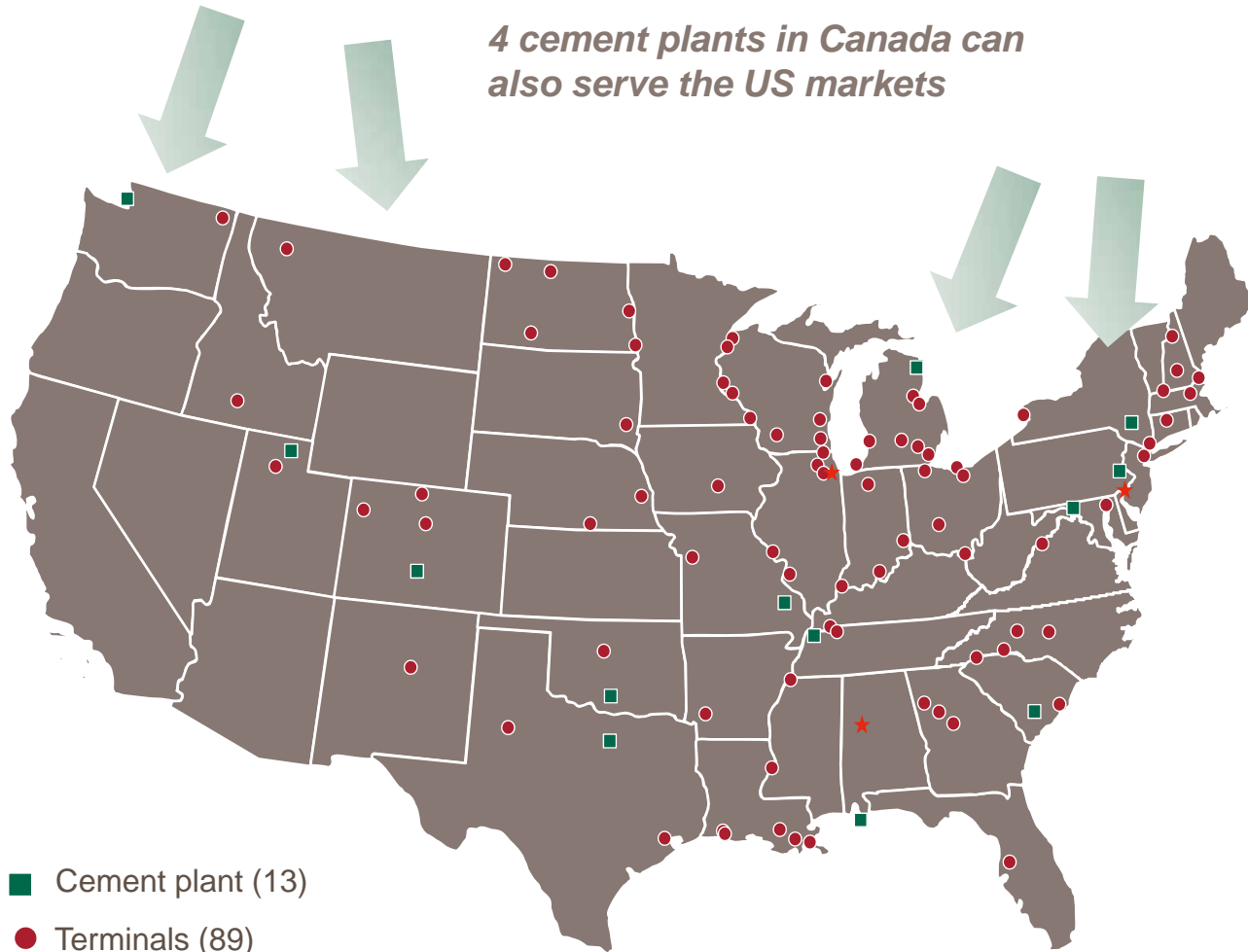
28 hot mix asphalt

6 regional ACM offices



Largest cement producer in the US market

4 cement plants in Canada can also serve the US markets



- Cement plant (13)
- Terminals (89)
- ★ Slag facility (3)



Strengths

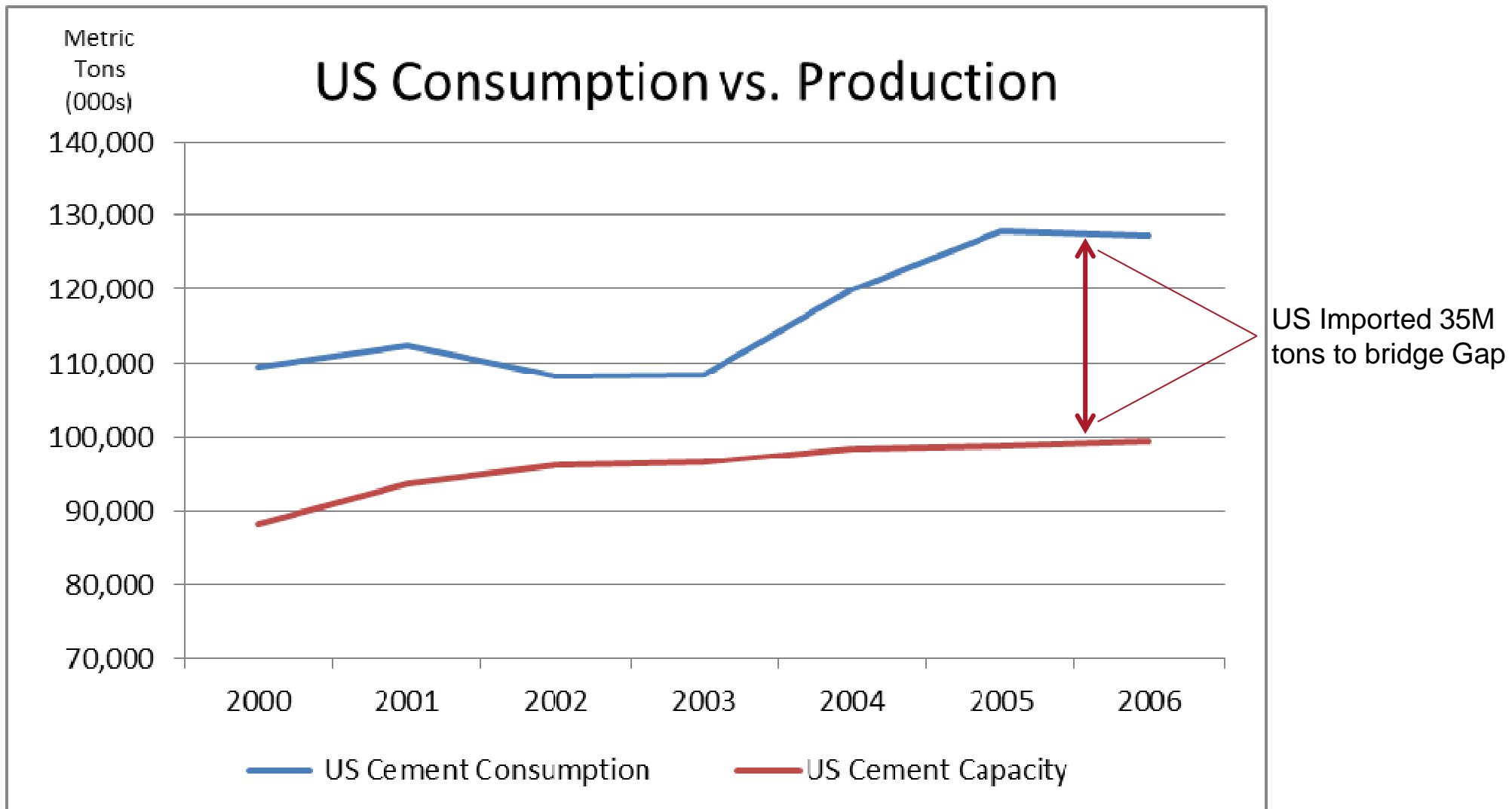
- #1 cement producer with 6Mt available capacity
- Unrivalled distribution network to provide uninterrupted supply to all key markets, including 2Mt additional free capacity from Canada
- A unique range of product offer

	<u>LTM</u>
Cement net sales (CHF bn)	2.2
Cement capacity (Mt)	20
FTE # (2016)	2,800

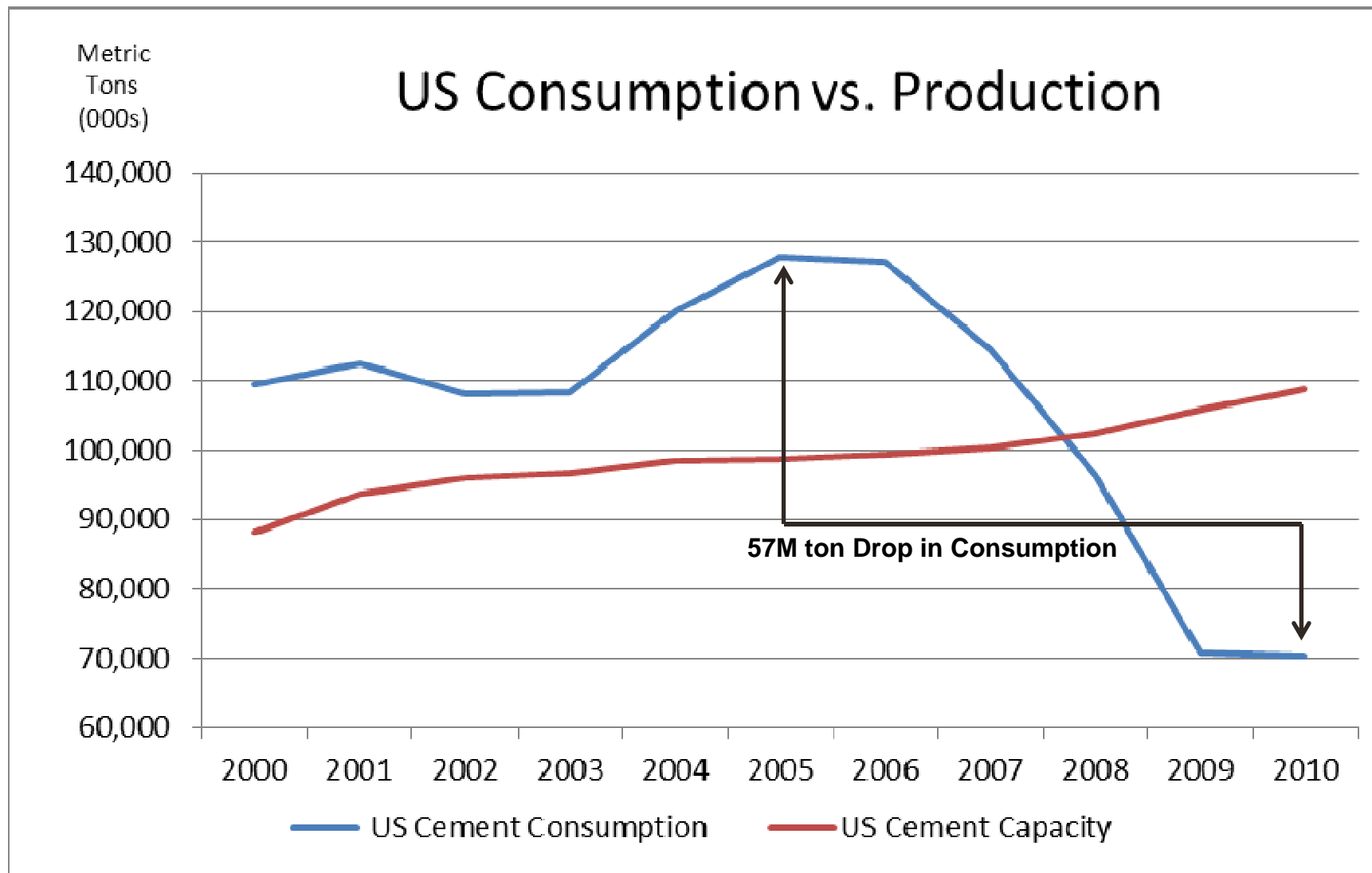
LafargeHolcim Position in the U.S.

RANK	COMPANY	CLINKER CAPACITY**	PERCENT OF INDUSTRY
1	LafargeHolcim	18,884	19.0%
2	CEMEX	14,580	14.7%
3	Lehigh Hanson, Inc.	9,136	9.2%
4	Buzzi Unicem, Inc.	8,108	8.2%
5	Ash Grove Cement Company	7,123	7.2%
6	CalPortland Company	5,217	5.3%
7	Essroc Cement Corp.	4,195	4.2%
8	Martin Marietta Materials, Inc.	3,971	4.0%
9	Argos USA Corporation	3,521	3.5%
10	Eagle Materials	3,441	3.5%
11	Titan America	2,955	3.0%
12	Giant Cement Holding	2,554	2.6%
13	Continental Cement Co., Inc.	1,904	1.9%
14	GCC of America Inc	1,875	1.9%
15	St. Marys Cement Inc (U.S.)/VCNA	1,870	1.9%
16	Mitsubishi Cement Corporation	1,498	1.5%
17	Texas-Lehigh Cement Company	1,118	1.1%
18	National Cement Co. Of California	1,033	1.0%
19	Monarch Cement Company	988	1.0%
20	American Cement Company	917	0.9%
21	Salt River Materials Group-Phoenix Cement	912	0.9%
22	National Cement Co. of Alabama	899	0.9%
23	Suwannee American Cement	814	0.8%
24	Capitol Aggregates, Ltd.	701	0.7%
25	Drake Cement	599	0.6%
26	Oldcastle Materials	280	0.3%
27	Armstrong Cement & Supply Corp.	264	0.3%
TOTAL CAPACITY		99,357	-

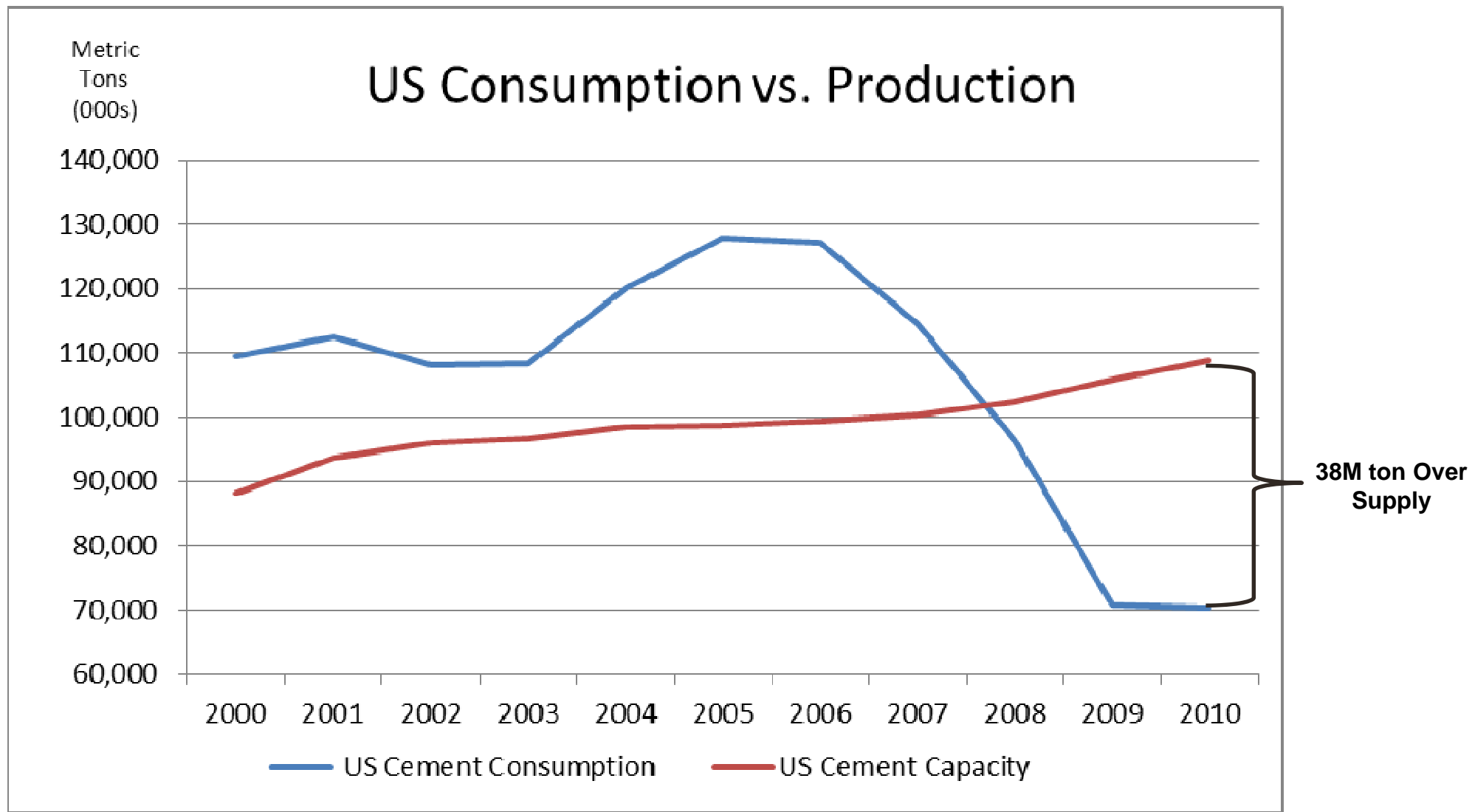
US Cement Historical Market Trend



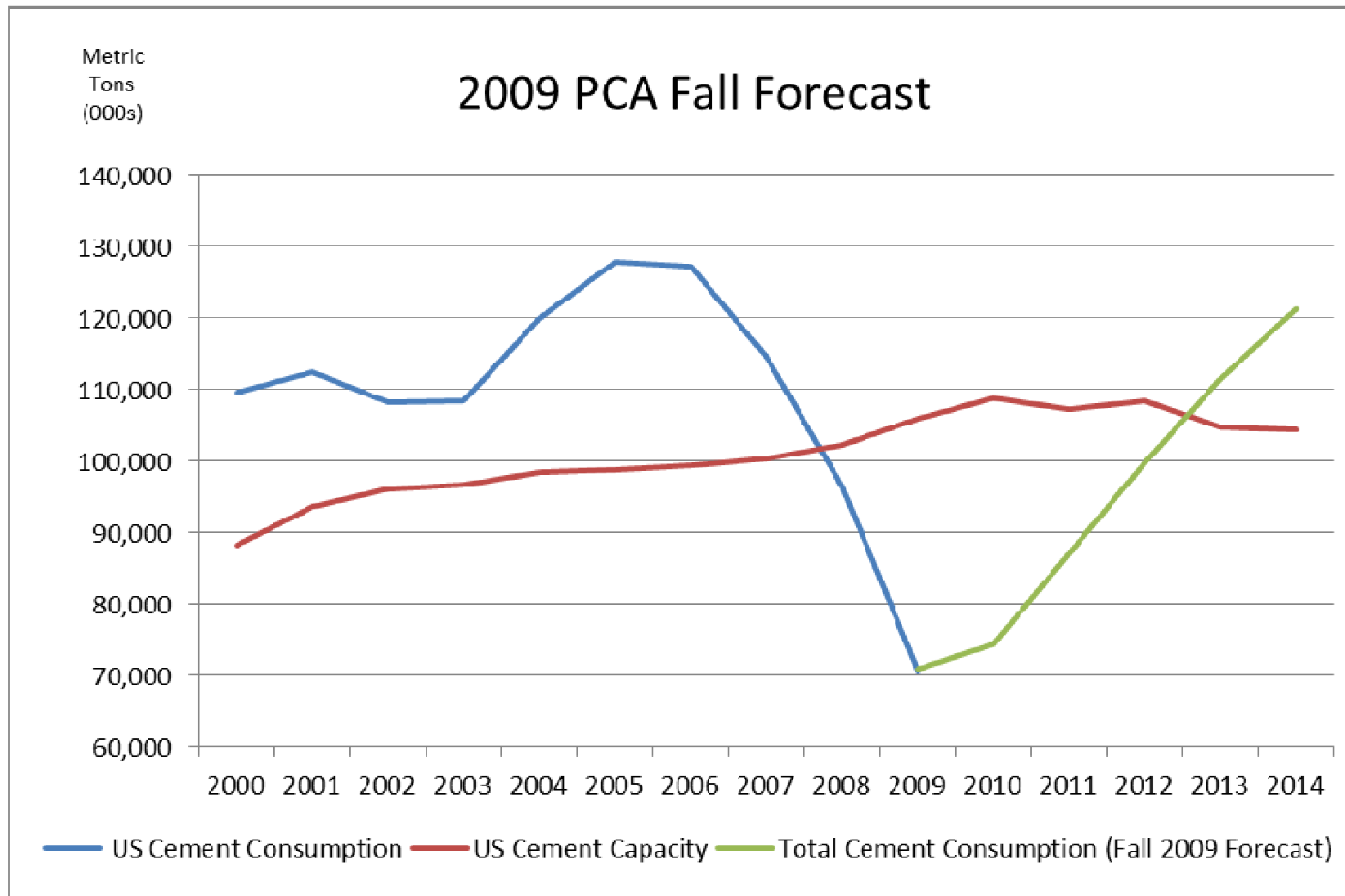
US Cement Historical Market Trend



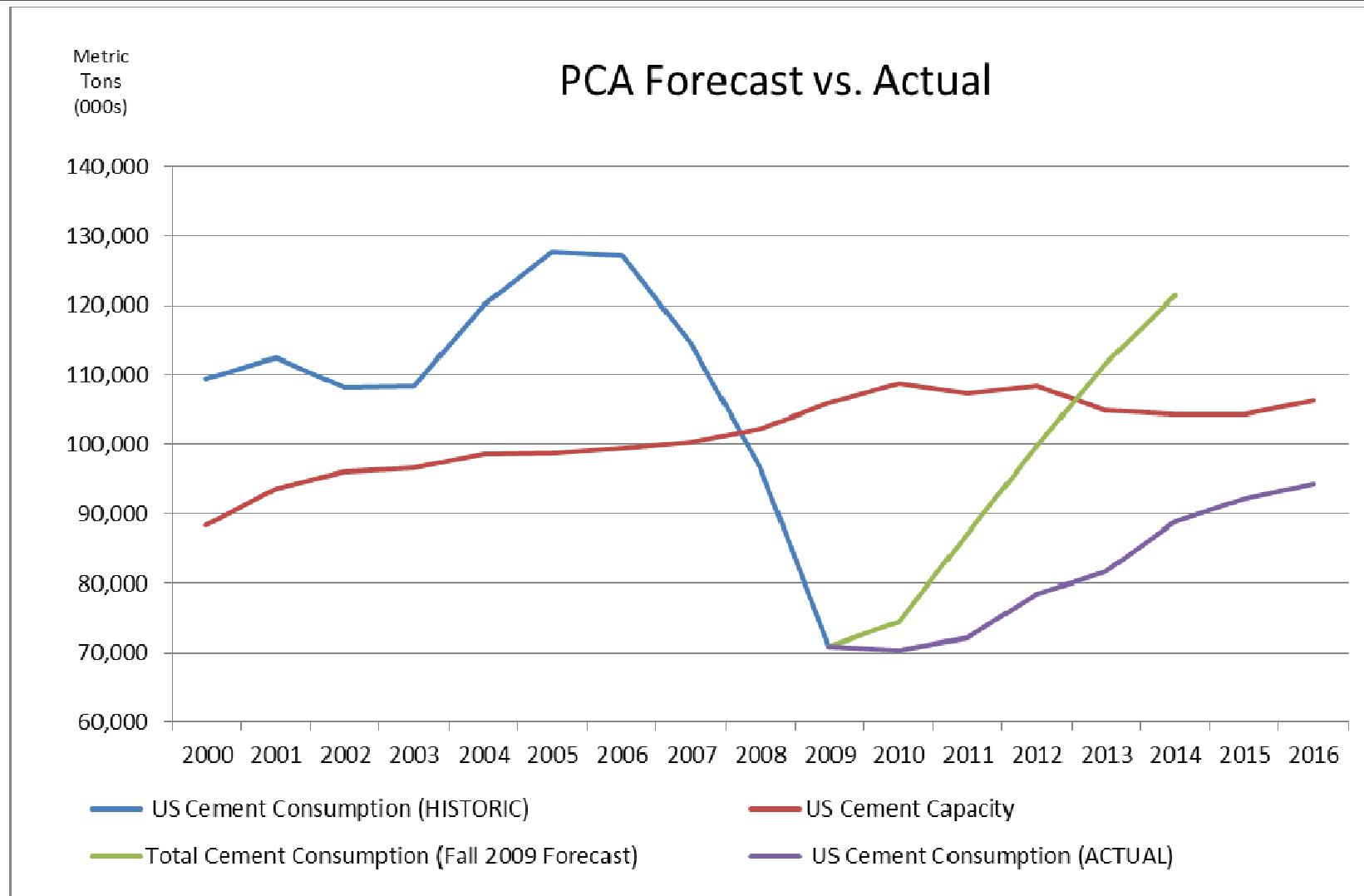
US Cement Historical Market Trend



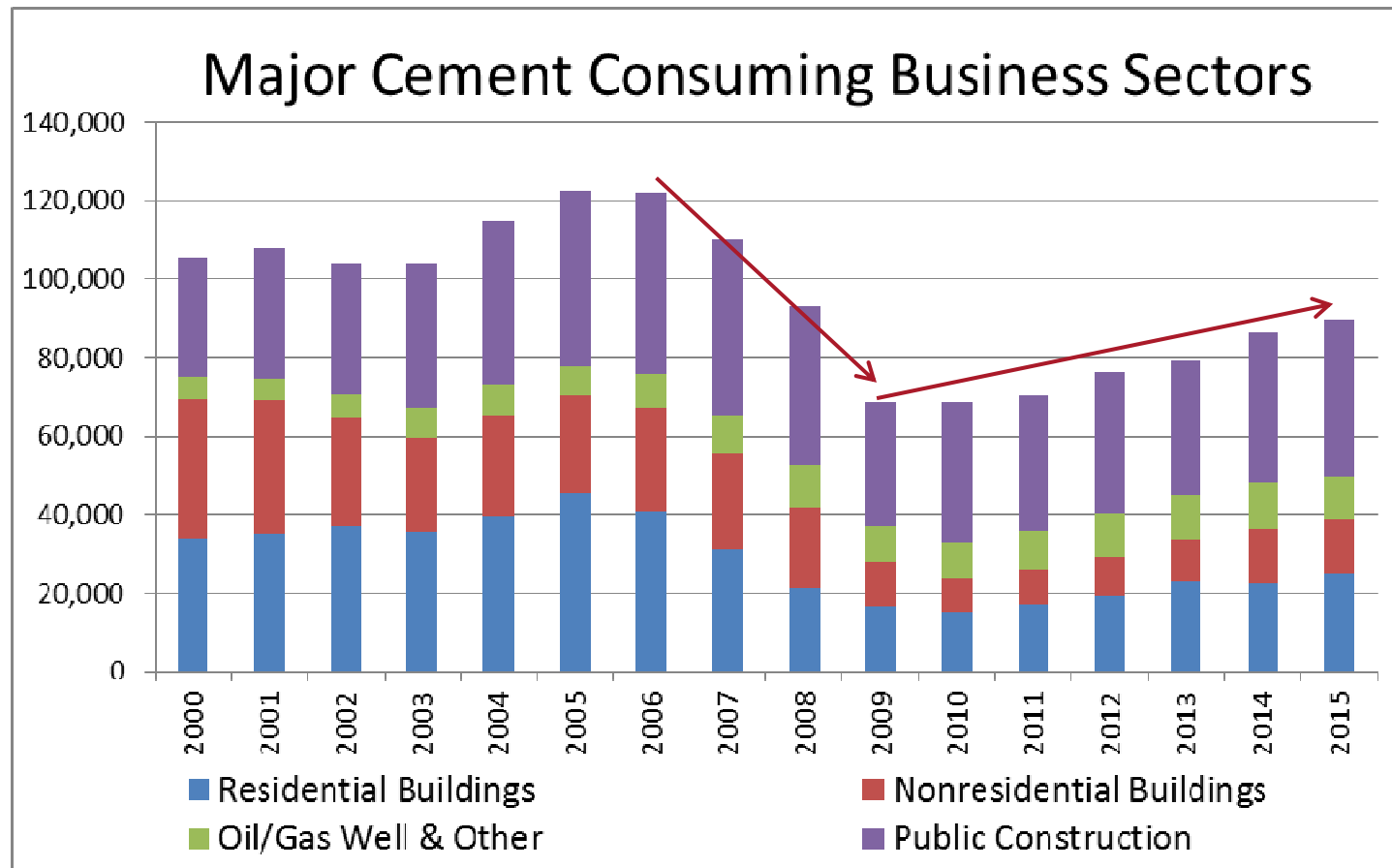
US Cement 2009 PCA Future Forecast



US Cement 2009 PCA Future Forecast vs. Actual



US Cement Historical Market Trend

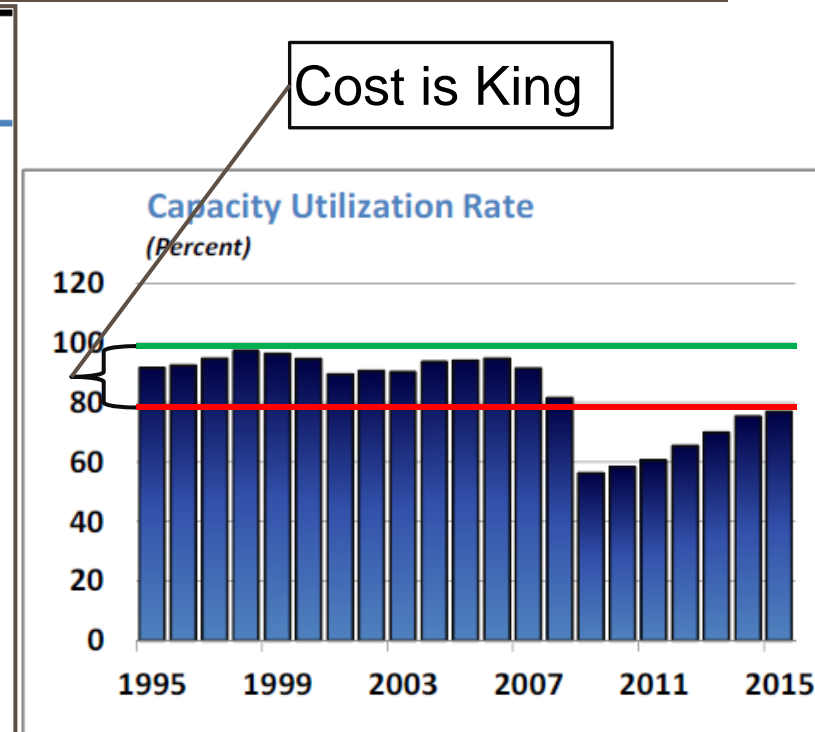


MAJOR CEMENT SECTORS	2006	2009	Delta
Residential Buildings	40,851	16,786	-59%
Nonresidential Buildings	26,336	11,352	-57%
Oil/Gas Well & Other	8,596	8,995	5%
Public Construction	46,065	31,554	-32%
Total	121,848	68,687	-44%

	2009	2015	Delta
Residential Buildings	16,786	24,709	47%
Nonresidential Buildings	11,352	14,010	23%
Oil/Gas Well & Other	8,995	11,048	23%
Public Construction	31,554	39,965	27%
Total	68,687	89,732	31%

US Cement Production Stats

Year	Clinker Production (MMT)	Clinker Capacity* (MMT)	Utilization Rate (%)
1995	70.0	76.3	91.7
1996	70.4	76.0	92.6
1997	72.7	76.7	94.8
1998	75.9	77.9	97.4
1999	77.3	80.2	96.4
2000	79.6	84.1	94.7
2001	79.9	89.2	89.5
2002	83.0	91.5	90.8
2003	83.2	92.1	90.4
2004	88.0	93.8	93.8
2005	88.7	94.1	94.3
2006	89.9	94.7	95.0
2007	87.5	95.6	91.6
2008	79.6	97.5	81.6
2009	56.9	100.9	56.4
2010	60.4	103.6	58.3
2011	62.0	102.2	60.6
2012	67.8	103.3	65.6
2013	69.9	99.9	70.0
2014	75.0	99.4	75.5
2015	76.6	99.4**	77.1

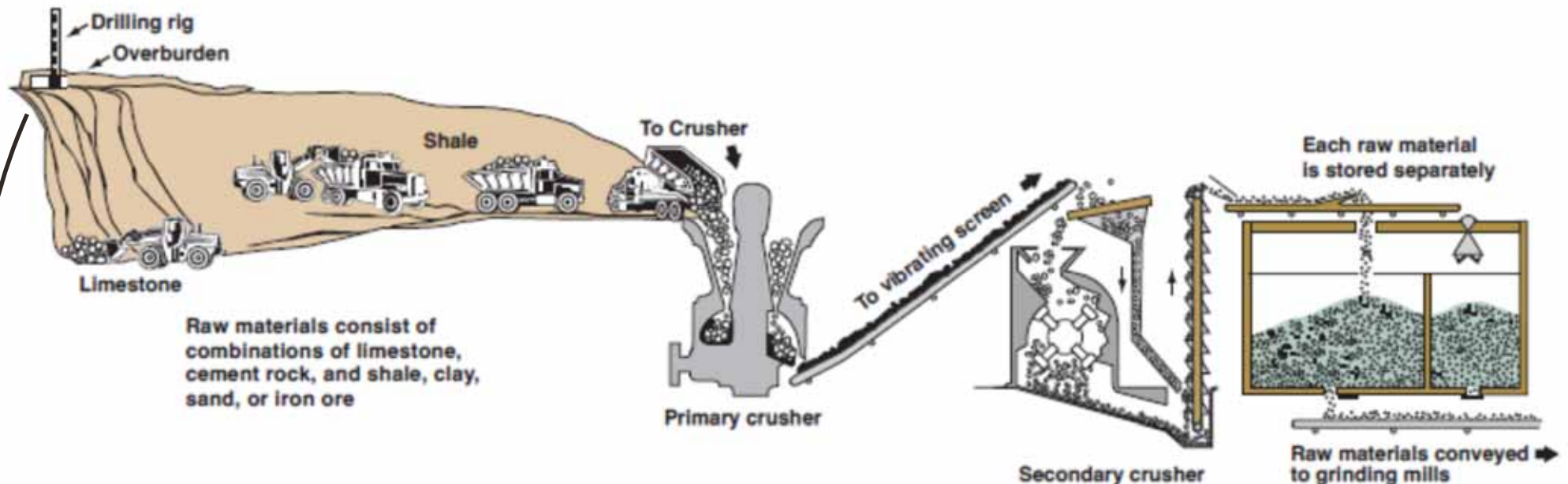


- 2006 @ 95% utilization rates at domestic plants
- 2009 @ 56% utilization rates at domestic plants
- 2015 Still only at roughly 77% utilization

Cement Manufacturing Process / 4 Main Steps



Step 1 – Raw Materials Selection & Crushing

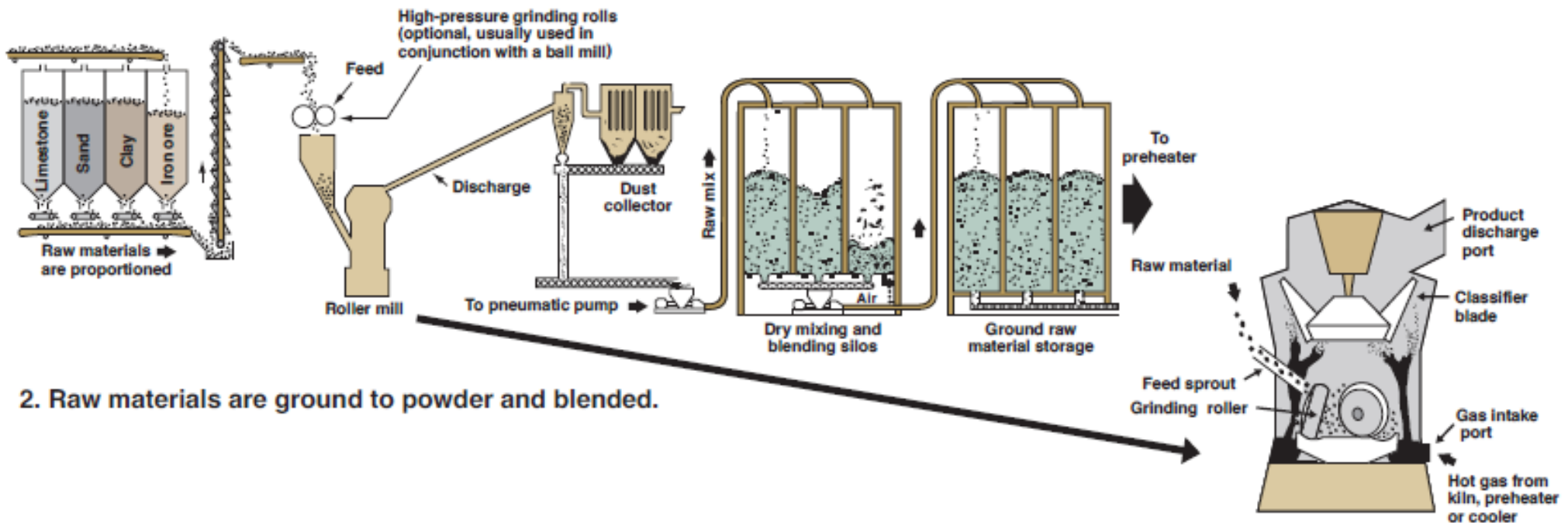


1. Stone is first reduced to 125 mm (5 in.) size, then to 20 mm (3/4 in.), and stored.



- Main Component of cement plant raw mix is limestone
- Limestone consists mainly of calcium, a lesser percentage of silica and possibly small amounts of alumina and iron
- Typically 80% - 90% of the mix

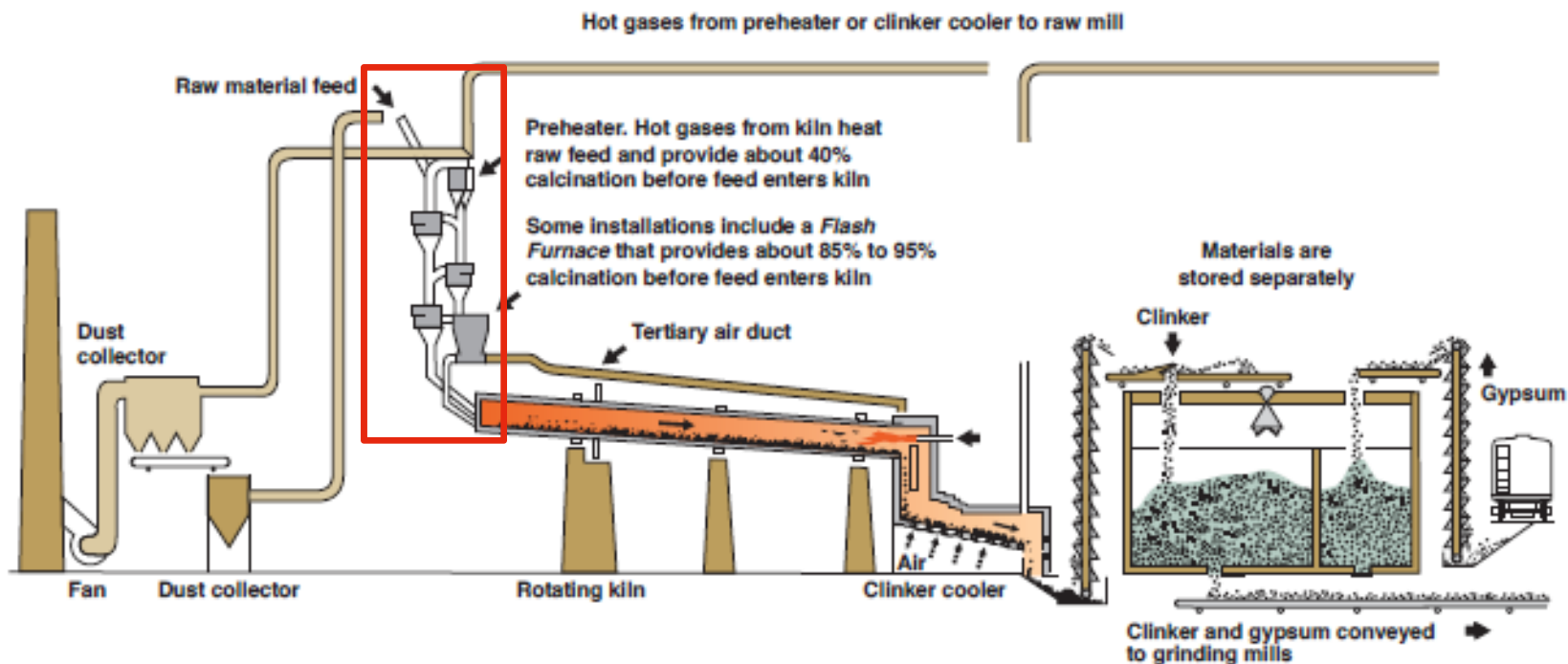
Step 2 – Raw Materials Milling & Blending



2. Raw materials are ground to powder and blended.

- Correctives may have to be added:
 - Silica
 - Alumina
 - Iron
- Precise blend of materials to for Raw Meal

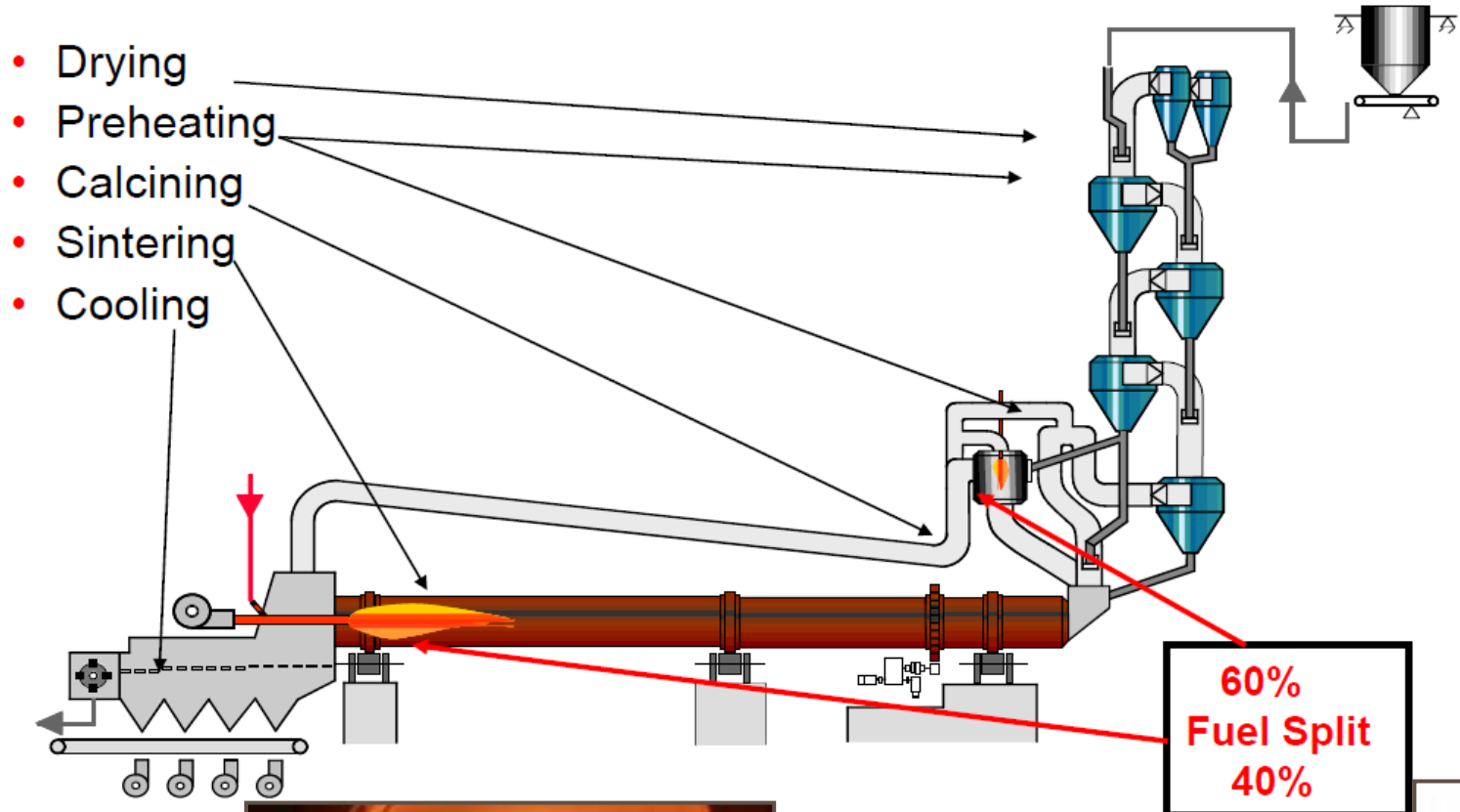
Step 3 – Preheater Tower



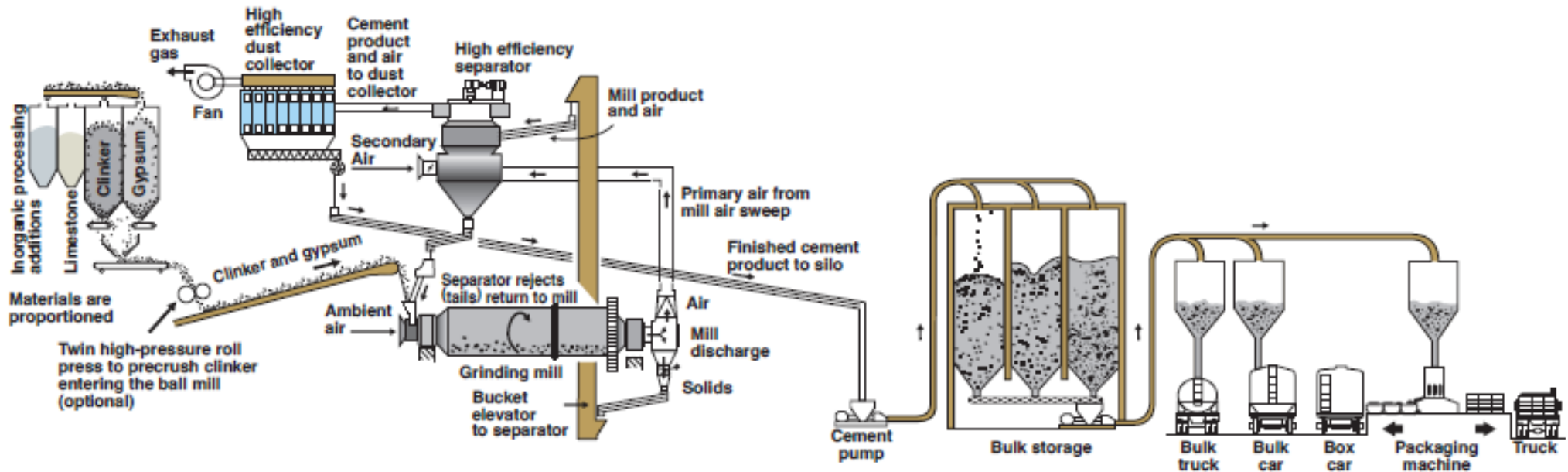
3. Burning changes raw mix chemically into cement clinker. Note four-stage preheater, flash furnaces, and shorter kiln.

- Raw Meal falls through series of cyclones
- Hot gases from kiln & cooler used to heat Raw Meal
- Raw Meal heated to approximately 700 – 900 degrees

Step 3 Cont. – Precaliner & Kiln



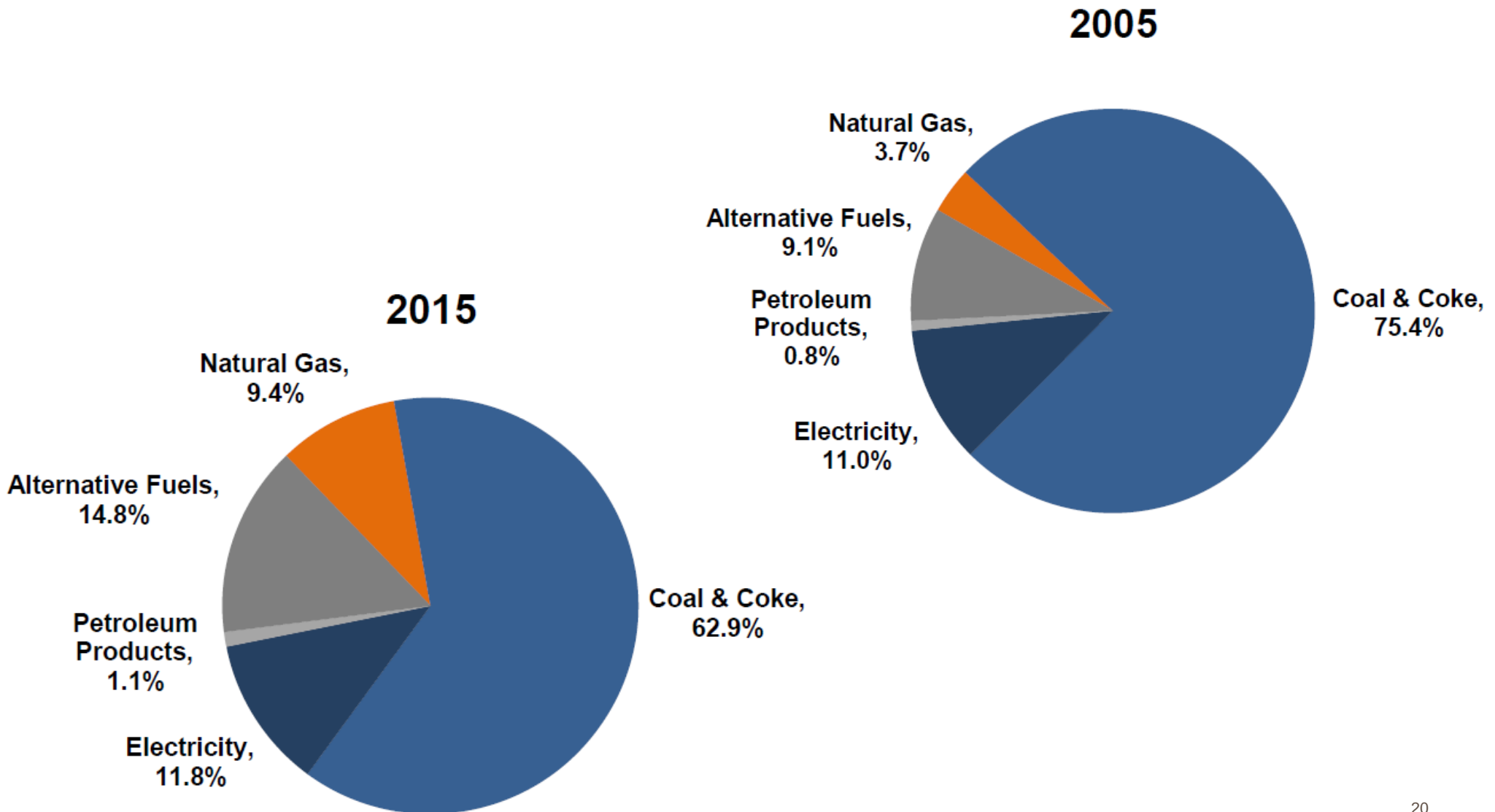
Step 4 – Cooling, Pulverizing and Gypsum addition



4. Clinker with gypsum, and limestone and/or inorganic processing additions are ground into portland cement and shipped.

- Raw Meal is cooled rapidly in final stage, forming Clinker
- Clinker is pulverized in Ball Mills to fine powder
- Gypsum added to regulate setting time

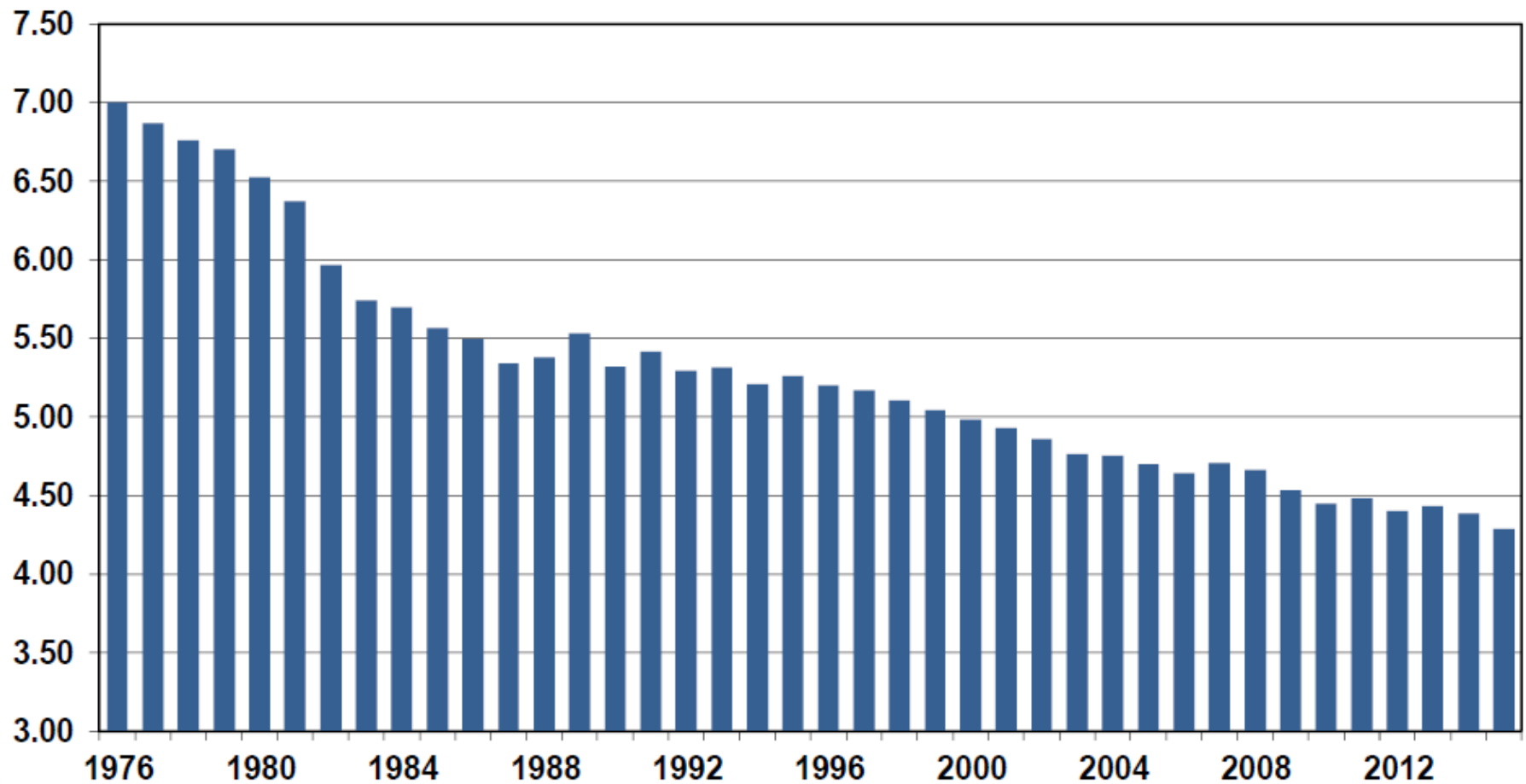
US Cement Industry Fuel Blend



US Cement Industry Energy Efficiency

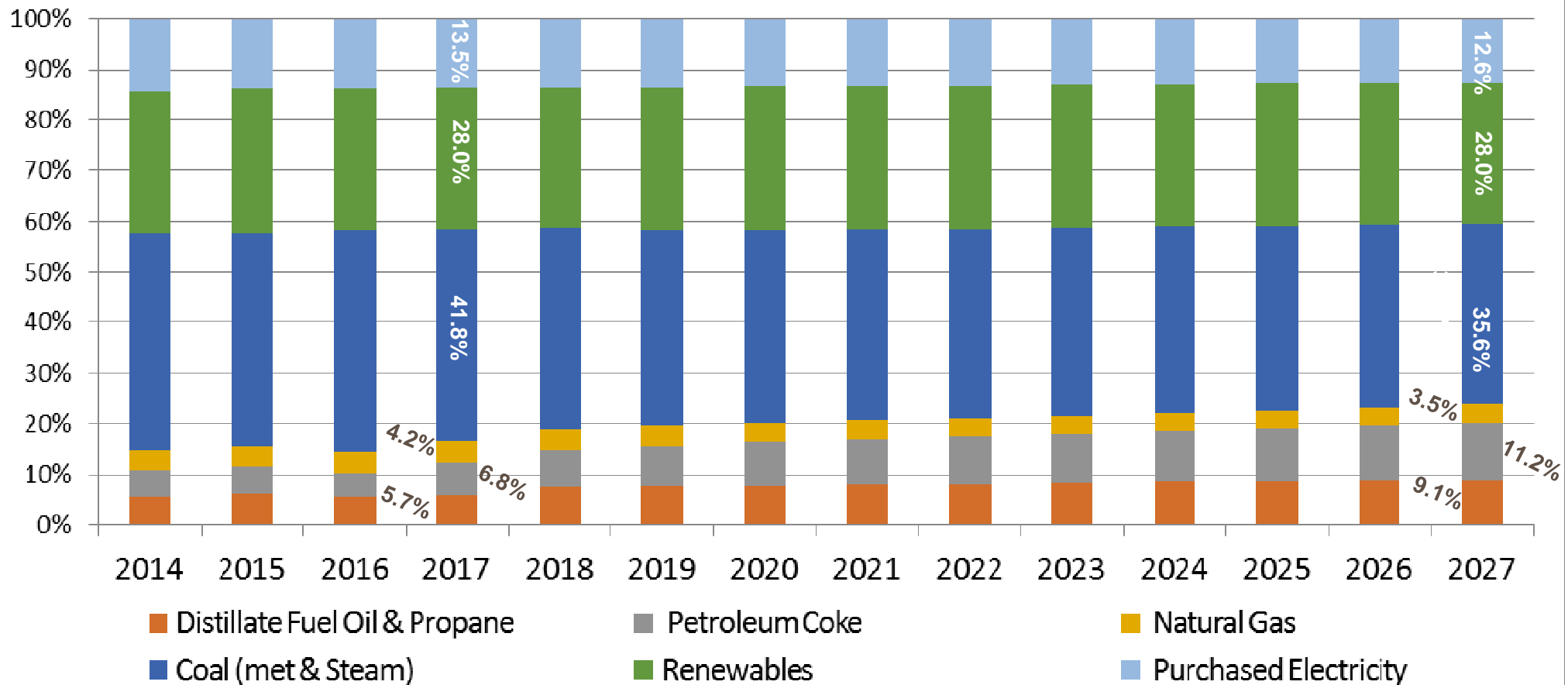
Energy Efficiency U.S. Cement Industry

Millions of BTU's
Per Metric Ton



Cement Industry Future Fuel Trends

EIA 2016 Annual Energy Outlook - Cement and Lime Industry Energy Consumption



Cement and Utility & Coal Industry Synergies

- **Distressed or Refuse Coal**
- **Fly Ash & Bottom ash as Raw Material**
- **Synthetic Gypsum**
- **Limestone**
- **Iron Byproducts**

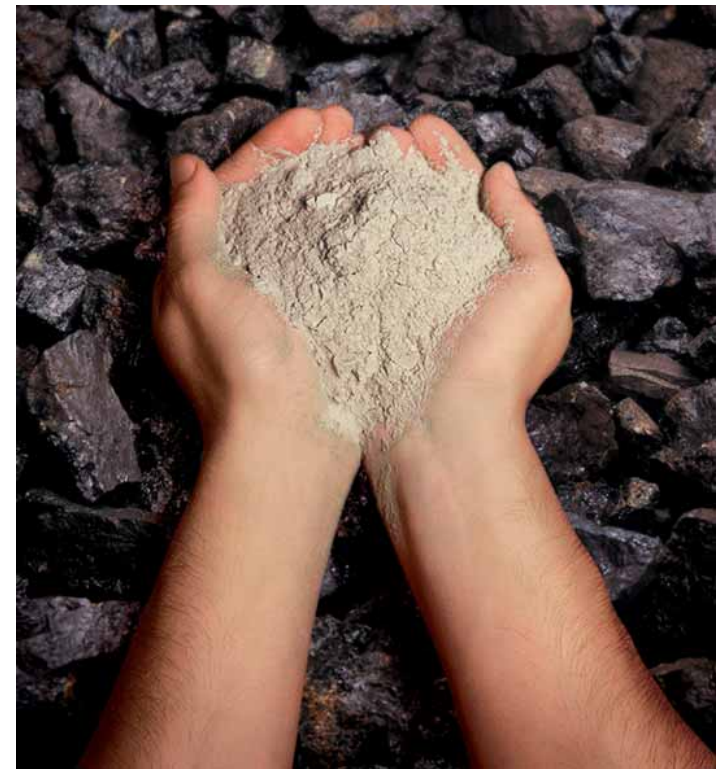
Cement and Utility & Coal Industry Synergies

- **Distressed or Refuse Coal**
 - Contaminated or co-mingled coal piles
 - Retired plant coal pile
 - Reclaiming Pad Coal
 - High Ash coal
 - Train wreck coal
- Fly Ash & Bottom ash as Raw Material
- Synthetic Gypsum
- Limestone
- Iron Byproducts



Cement and Utility & Coal Industry Synergies

- Distressed or Refuse Coal
- **Fly Ash & Bottom Ash as Raw Material**
 - Provides Alumina, Silica & iron in cement process
 - Utilize concrete grade ash (class F & C)
- Synthetic Gypsum
- Limestone
- Iron Byproducts



Cement and Utility & Coal Industry Synergies

- Distressed or Refuse Coal
- Fly Ash & Bottom Ash as Raw Material
- **Synthetic Gypsum**
 - Utilize at the end of our process vs. Natural Gypsum
 - Rateable off-take
- Limestone
- Iron Byproducts



Cement and Utility & Coal Industry Synergies

- Distressed or Refuse Coal
- Fly Ash & Bottom Ash as Raw Material
- Synthetic Gypsum
- **Limestone**
 - Expertise in operate quarries on each cement site
 - Potential backhaul with other byproducts
- Iron Byproducts



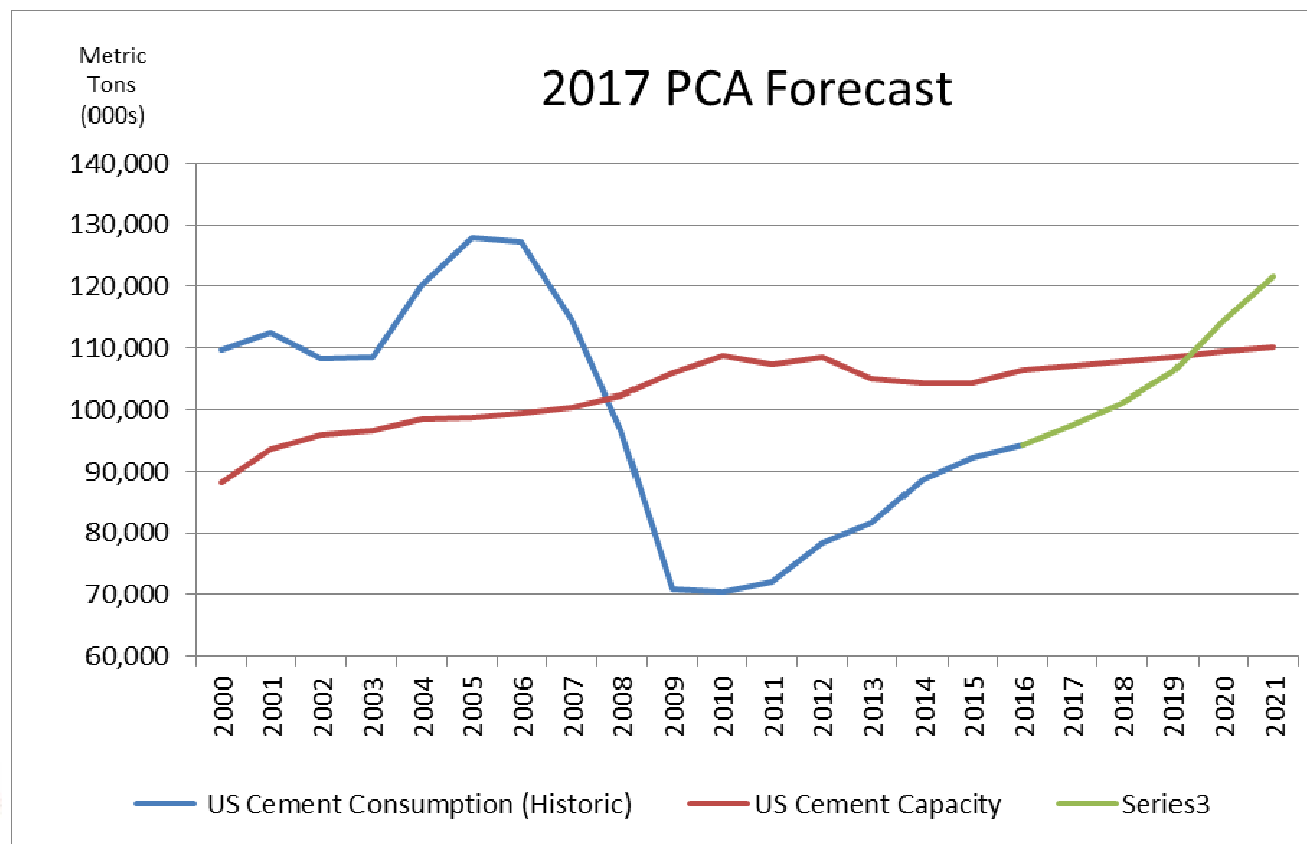
Cement and Utility & Coal Industry Synergies

- Distressed or Refuse Coal
- Fly Ash & Bottom Ash as Raw Material
- Synthetic Gypsum
- Limestone
- **Iron Byproducts**
 - **Low bearing Fe Materials**



Cement Industry Factors for Success & Conclusion

- 1. Maximize Output of High efficiency plants**
- 2. Partner with Suppliers of Raw materials and Fuels**
- 3. Diversify and Utilize Low cost fuels streams**



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