PCA
America's Cement Manufacturers™

MARKET INTELLIGENCE

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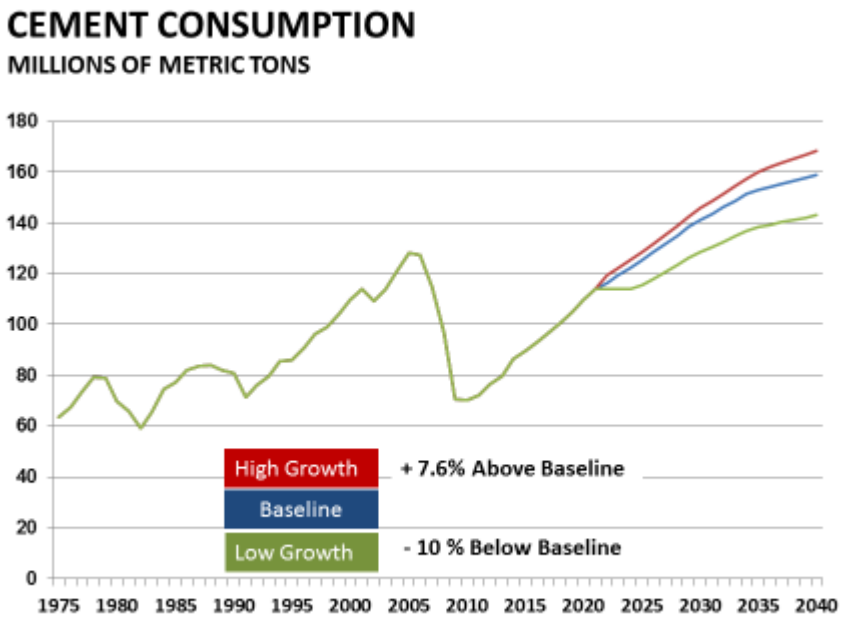
Long-Term Cement Outlook

Overview

PCA provides long-term assessments regarding cement consumption and sourcing in an effort to support long-term capital planning by our members, establish a likely environment in which the impacts of public policy can be assessed, and to identify potential market risks and opportunities. These assessments are rough and painted with a broad brush. As with any economic forecast, the longer the time horizon, the larger the risks attached to the projections. PCA's 25 year long-term forecast is not exempt from this reality.

Business cycles occur. As a result of imbalances built during expansionary periods, recessions occur and imbalances are corrected. This is followed by a new expansionary period until new imbalances materialize and the cycle begins anew. The causes for decline, the depth of decline, the exuberance of recovery, and the timing varies from cycle to cycle. Confined to such conditions, it is extremely difficult to predict business cycles over a 25 year horizon.

Currently, the United States' economy is in its 90th month of recovery. On average, recovery periods last 39 months. The current recovery is considered "old" by historical standards. Since 1975, recessions impacting the cement industry occur every 7.5 years and result in a peak-to-trough decline in cement consumption of roughly 14%. Some suggest, as a result, that a recession will materialize within the



next five years. It must be kept in mind, recessions have reasons that they materialize and are not subject to a time clock. The depth and longevity of the past recession, coupled with the tepid growth that has materialized thus far in the recovery, work to the detriment of factors contributing to the formation of a recession. This suggests the possibility of an extremely long recovery period.

In any case, PCA does not attempt to embark on efforts to time the next recession. Instead, a baseline scenario is presented that reflects no unbroken growth trends. PCA's baseline long-term projections reflect a myriad of assessments and assumptions and, therefore, significant risk should be attached to these long-term estimates.

Long-term total cement consumption estimates are driven by two key factors – population growth and cement consumption per capita. PCA's long-term outlook takes into consideration population and demographic changes anticipated by the United States Bureau of Census (BOC) and adjusted on a state-by-state basis using Moody's population estimates. Changes in cement consumption per capita are largely dependent on the vibrancy of long-term economic growth conditions.

It is important to note that growth among construction sectors is often supplemented by unique long-term trends that go beyond broad demographic and macroeconomic trends. In some instances, the composition of this growth in cement consumption among construction segments takes into consideration the impact of technology, cultural trends, and an active energy efficiency driven green building environment. A dissertation could be written on each topic. PCA includes assessments of these trends but applies a broad brush approach with regard to these phenomenon as well as issues such as space management, energy generation, on-line technologies, and resilient infrastructure.

Finally, long-term cement consumption considerations must be weighed against long-term cement sourcing conditions. Environmental legislation and sustained high energy prices, for example, are likely to result in the virtual elimination of wet process cement production. In addition, environmental regulations could force plant closures as well as deter investment for capacity expansion at a pace required to keep up with growth in consumption. Given estimated growth in cement consumption, there exists the potential for a gap in domestically sourced cement. Decisions regarding how to source the United States' market may begin to emerge in coming years when consumption levels approach domestic capacity limits.

In this report, PCA provides long-term projections for United States cement consumption and its distribution among market regions. Long-term consumption projections are weighed against potential sourcing conditions. Hopefully, this baseline will illuminate public policy, corporate planning, and industry promotional efforts.

Population Growth

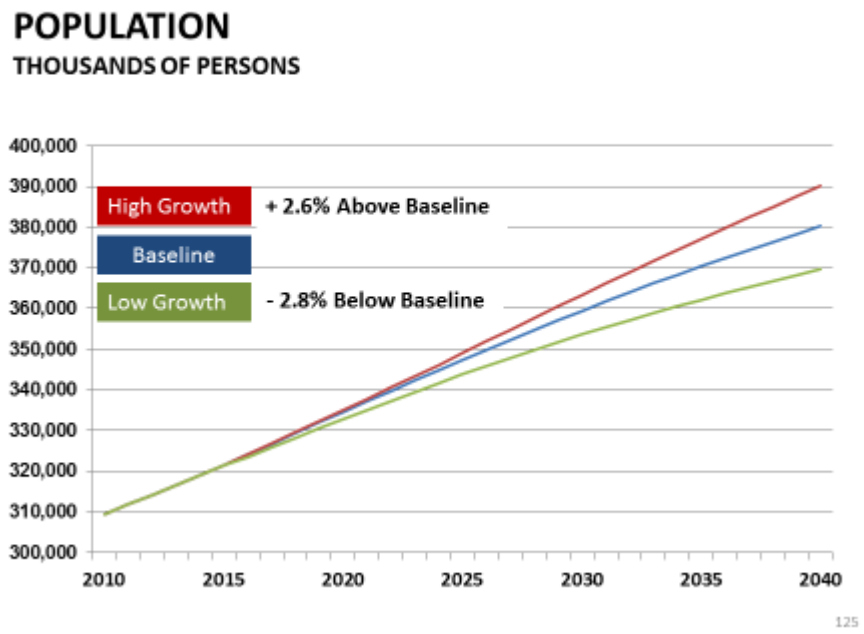
PCA leans heavily on population and demographic drivers for long-term cement consumption projections. In past projections, population growth accounted for upwards of 85% of total volume growth. While it remains a key driver, the United States cement market is still in recovery mode and its depressed levels suggest a greater proportion of the 2015-2040 period will be determined by growth in cement consumption per capita. Aside from this, we rely heavily on population growth.

Our reliance on population growth as a key driver is based on its relative stability as a long-term driver. Population growth is typically not volatile and yields more accurate long-term projections compared to many other drivers.

The expected increases in population will have a powerful impact on long-term cement consumption. Population increases will result in new requirements to expand highways, build schools, hospitals and other public buildings, construct new homes, and add to existing

commercial buildings. In the 25 years prior to the Great Recession (1982-2007), cement consumption grew 55.2 million metric tons. Of this, roughly 37 million metric tons or 67% is attributed to population growth. The remaining growth is attributed to economic growth and its composition.

During the forecast horizon, population growth may act as an even more important contributor to gains in long-term cement consumption. This result is likely in the context of slower long-term economic growth rates. If long-term per capita cement consumption levels are maintained at .326 cement tons consumed per capita (1980-2000 average), population growth alone would add 25 million metric tons annually to cement consumption by the end of the 2040. Economic growth and other factors could further add to this level.



According to the BOC baseline scenario, the population in the United States is expected to grow by nearly 62 million persons by 2040 compared to 2015 levels. Using BOC population projections, the 2015 U.S. population is currently estimated at 321 million individuals and is projected to reach 382 million by 2040. More than half of this near term growth is attributed to annual gains in net migration. In the later years of the forecast horizon, immigration accounts for more than 70% of population growth. Overall, the total level of growth reflects a compound annual growth rate (CAGR) of 0.7%.

Alternative scenarios are projected by the BOC by changing assumptions regarding birth rates, mortality rates, and immigration levels. According to the high growth scenario, population adds 68 million persons by 2040. In the low case scenario, population adds 48 million persons by 2040. In each scenario, the expected increase in population is not shared equally among all areas in the United States. Roughly two thirds of the population increase is expected to materialize in the southern and western regions.

Regional Population Growth

Dynamic regional population expansions are best measured by the percent growth in population. While the United States' population is expected to increase nearly 19% through 2040, eighteen states are expected to grow by more than 20%, of which 15 are located in the southern and western regions

of the United States. In contrast, the population in the Northeast, Great Lakes, North Central and South Central regions are each expected to grow by roughly 10% or less.

Population Growth Rankings Among States

	Fastest Growing States	2015-2040 Percent Change		Slowest Growing States	2015-2040 Percent Change
1	Arizona	50.50%	50	West Virginia	-3.70%
2	Nevada	49.60%	49	Maine	-1.70%
3	Texas	48.90%	48	Illinois	-1.20%
4	Utah	48.20%	47	Michigan	-0.50%
5	North Carolina	45.10%	46	Pennsylvania	0.10%
6	Florida	44.30%	45	Ohio	0.10%
7	Colorado	40.10%	44	Rhode Island	0.70%
8	South Carolina	36.10%	43	Connecticut	1.00%
9	Georgia	35.10%	42	Vermont	1.90%
10	Washington	33.40%	41	New York	2.90%
11	North Dakota	29.40%	40	Mississippi	3.90%
12	Wyoming	28.10%	39	New Hampshire	4.10%

The fundamental driver in the strong population growth expected in southern and western regions of the United States reflects the continuation of migration patterns brought about by the aging of the Baby Boomer generation and their retirement to warm climates. Furthermore, strong foreign immigration, more dynamic economic and labor market growth, as well as generally favorable tax rates, and pro-business environments compared to northern and eastern states are expected to remain in place. Indeed, the population drifts to the south and west may exacerbate the disparity in tax rates with northern states.

In contrast, northern states are typically characterized by neutral or adverse migration patterns brought about by the exodus of retired persons, less dynamic job markets, and weaker foreign immigration. In addition, many of the northern states are characterized by commercial and industrial bases that are exposed to the rigors of global competition. This exposure is particularly true of the Great Lakes region with its dependence on industries engaged in manufacturing. Weaker job markets associated with manufacturing intensive states accelerates the exodus of younger persons seeking better job opportunities in the south or west. It is likely a strong dollar may accelerate this shift during the early years of the forecast horizon.

The composition of commerce also plays a role in the Plains region. States with high dependence on commercial agriculture typically lack dynamic labor markets that attract the migration of population or the ability to retain significant growth in the indigenous population. As a result, states in the Great Plains are expected, at best, to show only modest net gains in population.

The combination of the United States' declining global competitive position in manufacturing, coupled with weak labor markets associated with agrarian-based economies, suggests labor market conditions will lead population growth toward more dynamic economies and employment opportunities – namely the southern and western states. The movement in population to the south and west will result in new pressures in these areas to expand construction activity in residential, nonresidential and public.

Public spending in these areas will probably include increased emphasis on water infrastructure. At the same time pressure mounts in these regions, the pressures will remain mild, or ease, in the north or east.

Demographic Growth & Age Cohorts

According to demographers, seven generations exert some impact on economic growth culture as well as the level of quality and type of construction activity during the forecast horizon that extends through 2040. The generations are named, and each runs roughly a 15 year time horizon for births. They include: the Greatest Generation, the Silent Generation, the Baby Boomer Generation, Generation X, the Millennials, Generation Y, and Generation Z. For the most part, the Greatest Generation and the Silent Generation have faded in its ongoing influence to the construction markets. This leaves the Baby Boomer Generations Y & X, and the Millennials exerting the most near-term impact of the forecast dynamics. Finally, Generation Z will begin to exert its influence by 2020.

The Demographic Waves: In Brief

Each generation imparts it's thumbprint on the United States' personality as a nation and the ideals it holds closest. As a result of the conditions endured by each generation, each has a decision making process that is distinct from other generations. These decisions can impact building and construction activity in the years ahead. As each generation ages, its influence grows, reaches a peak, and finally subsides as its numbers decline. This phenomenon is already in play for the 25 year long-term forecast horizon.

Among the seven generations listed, this report concentrates on those with the most influence and, of which there is at least some data, to suggest the direction of their influence on building activity. Accordingly, PCA does not address the impact on building activity emanating from the Greatest Generation, the Silent Generation, and Generation Z. Rather, the analysis focuses on influences of the Baby Boomer Generation, Generation X and the Millennials.

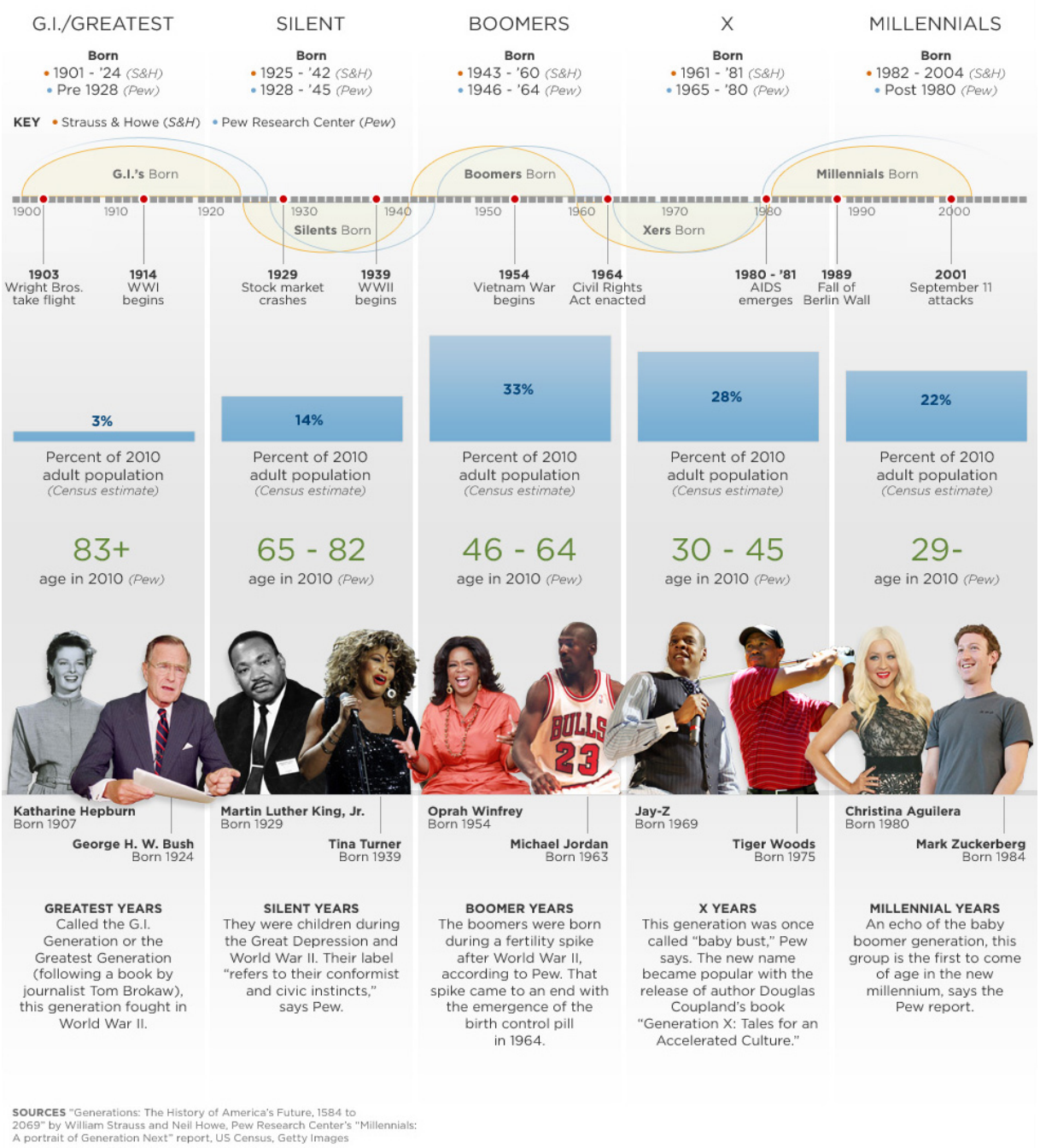
The Baby Boomers are aging. The aging of the Baby Boomers will have a profound effect on overall economic growth, regional population growth, and the growth rates among construction sectors. Throughout much of the 1970s, roughly five Baby Boomer individuals entered the workforce for every individual entering retirement. This Baby Boomer growth fueled new home construction as households were formed which created the necessity of road and infrastructure expansion. As suburbs expanded and families grew, increased need for schools and commercial services arose. This trend has continued for the last three decades as the labor force growth continued to outpace retirement growth.

As Boomers retire, this dynamic will reverse with two individuals entering retirement for every one person entering the labor force. The year 2012 was the first year that new retirees exceeded new entrants into the labor force. There are currently 37 million persons in the United States that are of retirement age, or roughly 10% of the population – this is expected to reach nearly 22% by 2040.

Medicaid spending has already surpassed spending on education and is now the largest expenditure among state budgets, accounting for 22% of total state spending. By 2040, the number of persons 65 or older will increase by 40 million persons, many of which will be dependent on entitlement programs such as Medicaid and Medicare. As much as 33% of state budgets could be absorbed by theses entitlement programs.

There is no magic solution to these hard numbers. With greater societal burdens, Generation Xers, the Millennials, and Generation Y will be taxed at a higher rate to pay for the increased expenditures implied by the aging population's increased dependence on entitlement programs to the detriment of

economic growth. The alternative to tax increases implies a harsh reduction in benefits. While there is the potential for some sort of compromised solution, there will be resistance to benefit reductions as well as to tax increases.



This implies state governments' financial resources will remain tight and new pressures on the ability to fund all of its programs will arise. State governments will prioritize spending programs. Keep in mind, more than 90% of all public construction efforts are performed at the state and local level of government. Increasingly, there is risk that funds typically earmarked for public building and infrastructure will be dedicated toward higher prioritized spending programs – namely entitlements.

Not only will the Boomer retirement phase impact the construction of health related and public construction activity, but it may also have significant influence on residential construction. The parents of Baby Boomers retired and sold their homes, said goodbye to their friends and local bonds, and moved to Florida, Arizona and other warm weather regions. It was a one home for one home swap – sell a home, buy a home. Arguably, the net impact on national construction was zero.

Baby Boomers are fiercely independent. They are unlikely to follow the patterns formed by their parents. Some suggest when they retire, they will sell their homes, maintain their local friendships by purchasing a townhouse/condo locally, and purchase a second home for an annual (cold weather) vacation. This scenario suggests sell one home, buy two – a net increase in demand for residential.

The Boomer demographic will also impact retail construction. Spending habits among consumers change as they age. While PCA's demographic review places emphasis on the impacts of an aging Baby Boomer population, it is a mistake to ignore the anticipated population changes among other age brackets and their respective impact on construction activity. Millennials are far different than the Boomers and will also have considerable impact on building activity in the years ahead.

According to population survey data, the share of 18-34 year-olds — also known as Millennials — living with their parents increased from around 27% before the housing crisis to 31%. Of those living with their parents, 44% of 18-34 year-olds were unemployed, while 25% held a job. This may be explained by the existence of overwhelming student debt levels, poor career job opportunities, and harsh lending standards.

Compared to past generations, economic circumstances may dictate that Millennials are slower to move out of their parents' homes. Presumably, this adverse phenomenon will work itself out as the job market continues to gain strength. When they do, they may move into roommate situations. Additionally, they are more urban. They will also marry later in life than past generations. Their children are also likely to occur at later stages of their lives than past generations.

The differences between generations go beyond residential and health care construction. Boomers are comfortable and confident in brick and mortar. Millennials, in contrast, have supreme confidence in electronic communications and technology. As the Boomers influence wanes and the Millennials influence grows, a movement away from retail box stores and more toward warehousing requirements associated with e-retailing may emerge. In terms of education, differences in the acceptance of technology suggests an increased propensity to learn on-line rather than in a formal classroom that characterized the Boomers. Perhaps the acceptance of technology also suggests new attitudes toward "work-at-home".

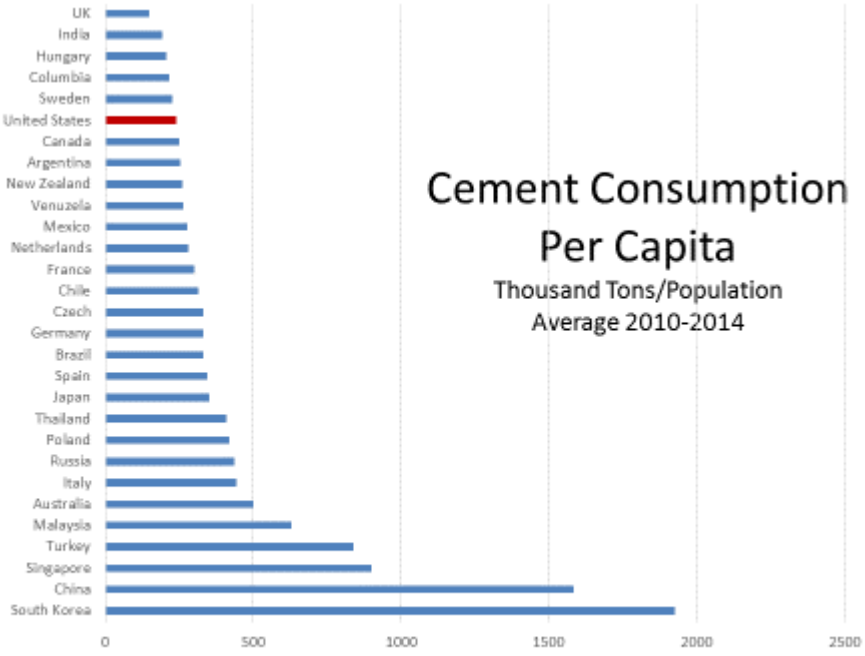
There are more differences among each of the generations – the examination of which goes beyond this report. The point is that economic conditions and stresses, technology, and space management will all imprint construction activity in the years ahead. The extent to which these trends exerts its influence depends upon the population volume by age cohort.

As the years pass and moving toward the end of the forecast horizon (2040), the Baby Boomer Generation will see its influence on building markets wane – just as the Greatest Generation has seen its on-going influence decline. At the same time, Generation X and the Millennials' influence will reach a peak and gradually be replaced by the cultural influences of Generation Y and Z.

It is this sequence of generational influence – the emergence, the apex, and the waning of influence, only to be replaced by the ***next wave*** generated by the new generation and the cycle repeated – that age demographics and its influence on building activity can be assessed – each generation representing a wave and each wave exerting its influence on the level and type of building activity.

Economic Growth and Cement Consumption Per Capita

Per capita cement consumption plays a critical role in determining long-term cement consumption. Currently, United States cement consumption per capita is relatively low compared to economies around the world and reflects a level associated with more mature economies. China, South Korea and Singapore each approach or exceed 1,000 metric tons per thousand persons. Among developed economies, Germany and France average roughly 315 tons per thousand persons compared to the United States average of 239 tons per thousand persons during the 2000-2014 period.



How much cement is consumed per capita is largely dependent on the vibrancy of the economic base upon which it supports. Economic vibrancy implies healthy national, state, and local government fiscal conditions. In this context, each public entity can respond to the needs of the population in terms of roadways, schools, health care, and other public buildings.

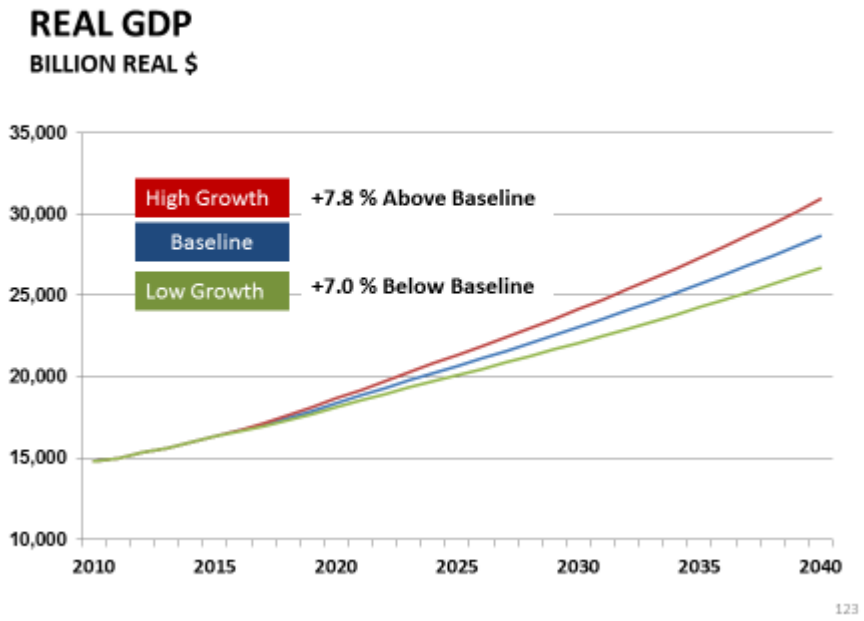
Economic vibrancy implies healthy labor markets which translates into stronger ROIs for nonresidential properties – supporting long-term nonresidential construction. Economic vibrancy implies higher employment and income levels which supports stronger household formation – underpinning strong residential sector growth. Per capita cement consumption is tied to economic growth (measured by real GDP) because it implies stronger construction levels – to the benefit of cement consumption.

Since World War II, the United States has averaged 3.4% real GDP growth annually. Many economists expect roughly the same rate of growth will continue well into the future. Unfortunately, long-term economic growth in the United States is expected by PCA to underperform past long-term historical patterns. Many factors contribute to this assessment which some economists have labeled as “Secular Stagnation”. PCA’s baseline real GDP forecast estimates annual growth rates at 2.2% annually. At such growth, real GDP is expected to approach $30 trillion. The expected rate of growth is nearly half the rate. Consider the following three key factors:

- Baby Boomers are retiring. Large segments of the population are moving out of ages that are attached to peak consumer goods buying levels. This implies a slowdown in consumer spending – the largest contributor to economic activity in the United States economy.

- The United States federal government has massive debt levels estimated at more than $19 trillion dollars. This debt must be reduced and will likely require spending austerity and tax increases – both of which will steal from future economic growth rates. The federal debt issue is often repeated at the state and local levels – amplifying the debt issue.

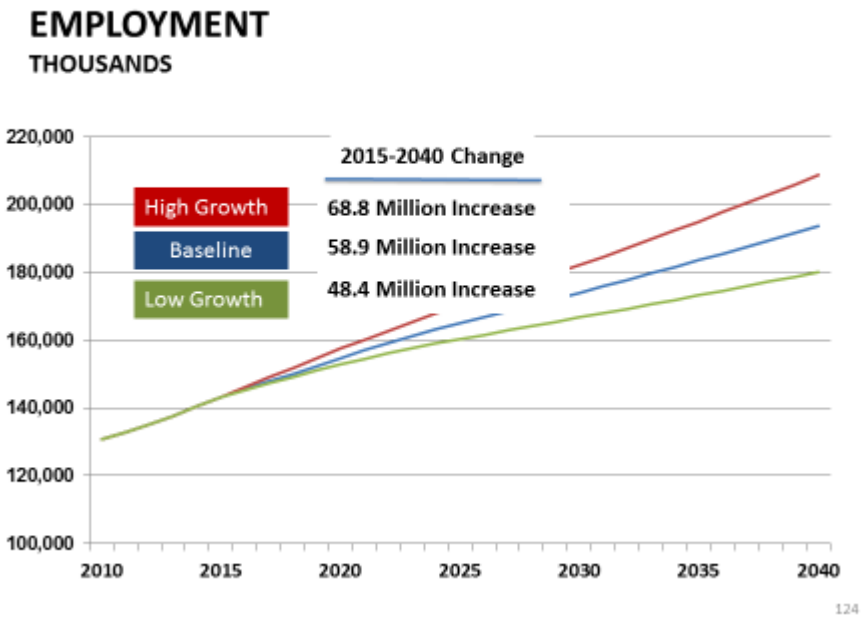
- In a growing economy, the existence of significant income inequality suggests that a disproportionate share of income generation go to the wealthy and not the middle class whose spending is a principal force in generating future growth.



In part and because of these factors, PCA's baseline long-term real GDP forecast estimates long-term annual growth rates at 2.1% annually. The expected rate of growth is nearly half the rate historically experienced. High and low scenarios are also calculated. The high growth scenario maintains an average annual growth rate of 2.5%. The low growth scenario maintains an average annual growth rate of 1.8%.

PCA performed correlation analysis between changes in economic growth and changes in per capita cement consumption over the past thirty years. Generally, a 1% increase in real GDP growth translates into a 0.7% increase in per capita consumption.

The past recession resulted in nearly a 54% decline in per capita cement consumption between 2005 and 2009. The United States' construction market is still in the midst of recovery. Per capita cement consumption is not expected to reach the pre-boom construction average (2000-2004) until 2020. Since the construction market is still recovering and below "normal" levels, applying the formula of 1% growth in real GDP to 0.7% increase in per capita cement consumption to 2016 levels would result in a significant underestimation of long-term cement consumption. As a result, the formula is not applied until 2021 – after the recovery stage is complete.



Cement Consumption Outlook: Top-Down Conclusions

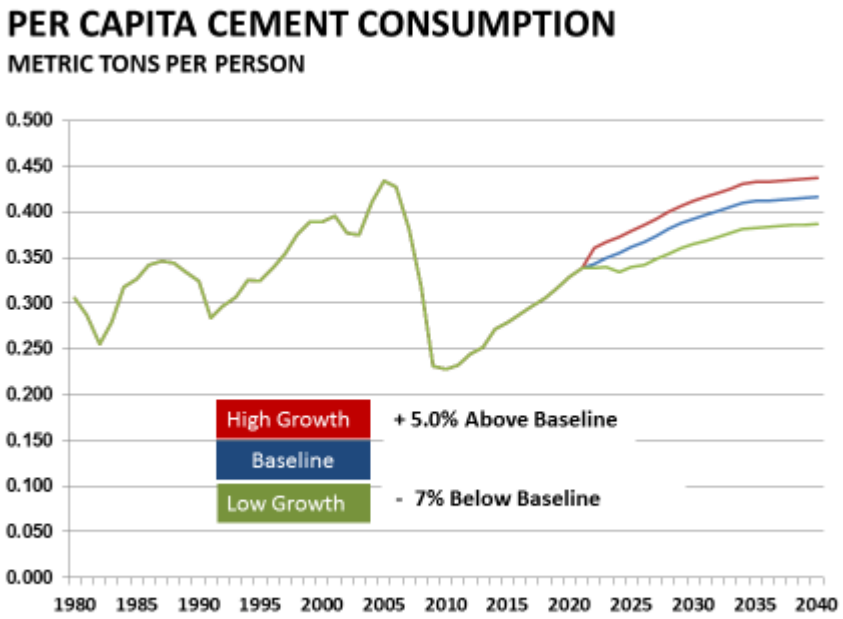
State-by-state population growth estimates are combined with state-by-state economic growth and per capita cement consumption estimates to yield state cement consumption. The states are then summed and provide a baseline long-term national cement consumption forecast. By changing the assumptions regarding population and economic growth, alternative high and low scenarios are generated. These estimates are used to extend beyond PCA's short-term projections that run through 2020.

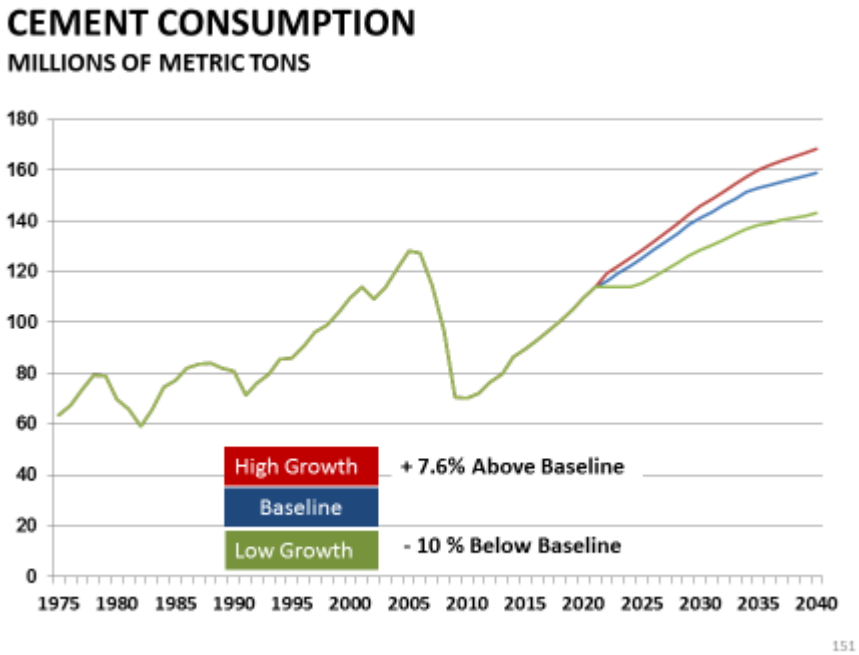
According to this long-term forecasting approach, cement consumption reaches 162 million metric tons by 2040 – reflecting nearly an 80% gain over depressed 2015 levels. Of this 70 million metric ton increase, slightly more than 50% is attributed to population gains and the remaining tonnage is attributed to economic growth and the resulting gains in per capita consumption. Keep in mind, since the cement market is still recovering, large gains in per capita consumption occur during 2015-2020 (accounting for a 22% increase). After the recovery period is complete, population gains are the principal driver in long-term growth.

Regionally, most of the growth in cement consumption is concentrated in the south and southwest regions of the United States. These regions account for 70% of total growth in national cement consumption through 2040.

It should be noted that the current long-term projections expect lower volume than the previous forecast four years ago. Several factors account for the reduction. First, population is 15 million persons lower than previously projected by the Bureau of Census/Moody's. Second, slower global economic growth is envisioned. This leads to lower energy prices, thereby diluting concrete construction aimed at green building. Slower global growth also tends to benefit concrete's building material competitors – leading to reduced market share for concrete products. Third, in part due to slower global economic growth, slower economic growth in the United States is expected compared

to the previous forecast. Slower economic expansion translates into slower growth in per capita consumption. Fourth, in light of efforts to reduce carbon footprint, concrete is likely to use more supplementary cementitious materials in the mix as a substitute for cement.





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Cement Sourcing

Long-term cement sourcing is determined by imports, existing kiln capacity, kiln capacity expansions and retirements, and additions to the mix such as limestone and inorganic materials. The economic and regulatory environment will play key roles in the growth in domestic cement sourcing. The ease and availability of import supply is expected to be influenced by world economic growth conditions, international capacity and consumption, and conditions impacting the dry bulk shipping industry.

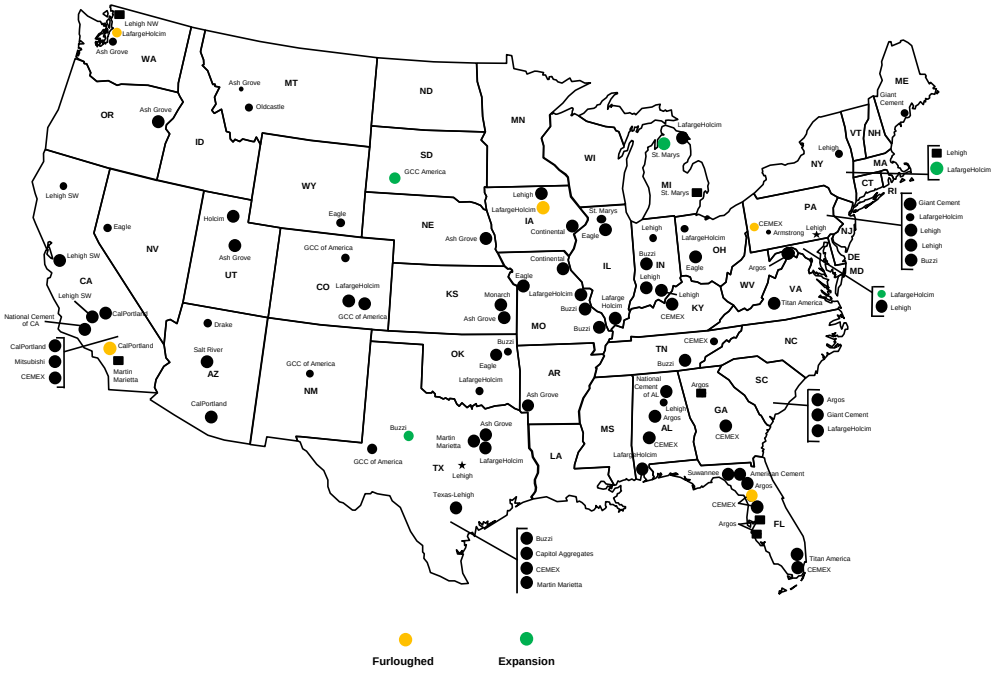
The domestic portland cement industry in the United States is currently comprised of 26 producers operating 97 plants and 143 kilns with an estimated domestic clinker capacity of 100 million metric tons (MMT). Gypsum is mixed with clinker to form portland cement. Of this, 96 million metric tons are active and the remainder are temporarily inactive. Currently, the utilization rate for the industry is estimated at 79%. Gypsum/limestone currently accounts for approximately 8.0% of the mix. Including additions, domestic cement sourcing is currently estimated at 108 million metric tons.

Aside from domestic sourcing, the industry operates roughly 125 import terminals with an estimated import capacity of 45 million metric tons. The ability and willingness to import cement is determined by consumption conditions, foreign cement availability, prevailing global shipping rates, and the availability of ships to carry cement. Cement imports are currently at 11.3 million metric tons in 2015, reflecting a utilization rate of roughly 25%.

At 100% utilization levels, the combined domestic and import capacities total 145 million metric tons of clinker and more than 155 million metric tons of cement after allowing for the addition of supplementary cementitious materials. At real world operating maximums of 85% to 90%, the United States' capacity is roughly 130 to 140 million metric tons.

Capacity Expansion: According to public announcements, the industry plans to add 2.1 million metric tons of clinker capacity via four expansions of existing sites during 2015-2020. Some expansions are considered doubtful that they will materialize. No greenfield expansions are planned. Beyond 2020, significant capacity increases do not seem to be in the cards – at least for the near term.

Snapshot: United States' Cement Plants & Expansions

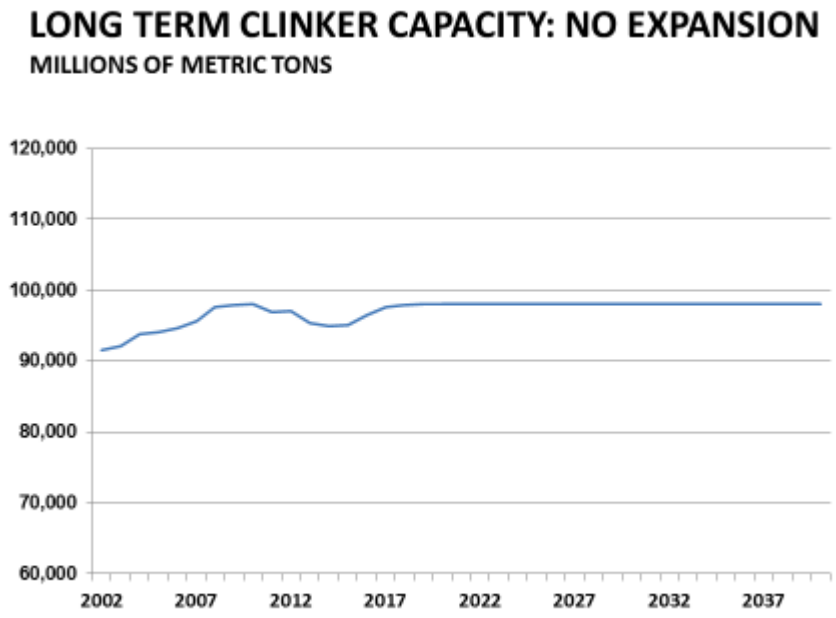


The existing investment environment does not support an aggressive capacity expansion scenario. More than 90% of all import terminals are operated by domestic players and enter the United States' market as supplements – not as a competitive force. Global export sources are abundant and capacity utilization is low as a result of aggressive expansion outside the United States. Because the dollar is strong, abundant foreign sources are cheap. Furthermore, growth in world trade has not kept pace with the expansion in the global dry-bulk shipping fleet. As a result, freight rates have declined dramatically and are expected to remain low. This scenario suggests that domestic players will have access to cheap foreign sources for quite some time.

The availability of cheap imports may forestall significant domestic expansion particularly in light of a new more rigorous federal regulatory environment whose adversity may be dramatically amplified by state and local regulatory agencies.

Furthermore, nearly 80% of the United States' cement industry is comprised of multinational corporate ownership. United States' arm of the multinational, burdened by harsh environmental and permitting regulations, must compete on an expected ROI basis against other corporate regions for scarce investment capital. Emerging countries – those in take-off stage of economic development that typically favor heavy infrastructure investments – are often characterized by burgeoning consumption and high expected ROI's attached to cement investments.

The combination of cheap and abundant foreign sources, coupled with rigid regulatory compliance investments, and an attractive investment climate outside the United States implies that significant expansion of domestic capacity will not materialize in the near term. PCA holds capacity constant at 2020 levels through the remainder of the forecast horizon. This assumption may have merit. During 1980-1996, for example, United States' cement capacity was largely unchanged.

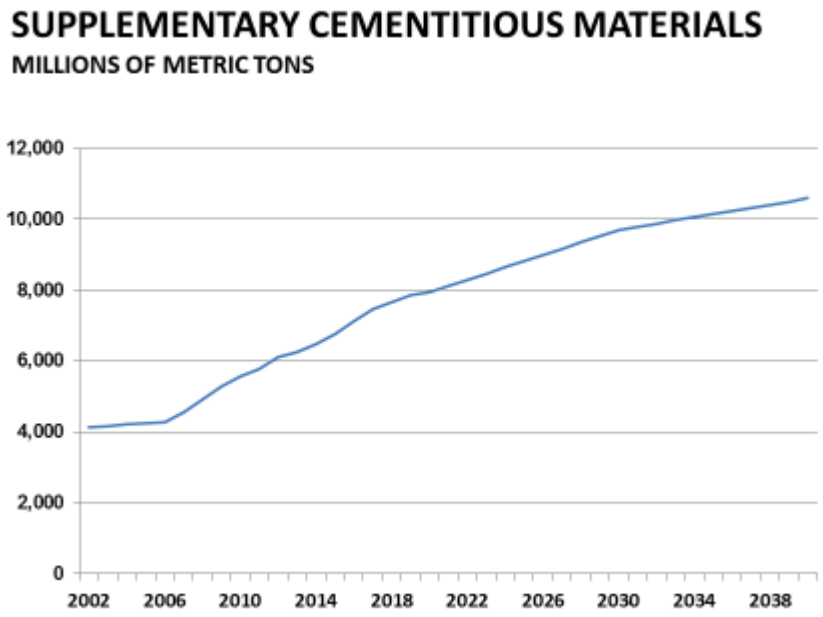


Plant Retirements: Economic stress and weak cement consumption during the downturn resulted in permanent or temporary displacement of production capacity at 18 plants resulting in clinker capacity displacements of 10.8 million metric tons. Of the closure announcements since 2008, temporary

shutdowns since reflect a total of 4.6 million metric tons, with only one plant representing 640,000 metric tons of capacity reopening. Each of these plants have been shuttered for more than five years. For forecasting purposes, PCA assumes no re-opening of these plants.

These retirements are likely to be supplemented by further wet kiln shutdowns. Wet kiln capacity is currently 2.4 million metric tons. Based on PCA's Labor-Energy Input Survey, the wet kiln process is 71% more energy intensive compared to dry kilns. In the context of rising energy prices and EPA regulations, it is possible that some of these plants could face closure by the end of the forecast horizon. While the energy outlook is uncertain, PCA expects wet kiln capacity will decline to less than one million metric tons. This phenomenon nearly offsets the expected increases in capacity via expansion.

Supplementary Cementitious Materials: In addition to clinker capacity adjustments, changes in U.S. specifications allowing for increased use of limestone in portland cement could increase the potential domestic sourcing. Changes in U.S. specifications allow for increased use of inorganic cementitious materials such as fly ash and slag. How much these specification changes increase cement capacity depends on how plants elect to exercise these options. Gypsum/limestone allowances currently add approximately 6.0% to cement capacity. PCA expects that total additions will grow to 10% by 2020 and to 12% by 2040. By 2040 these additions could add 3.2 million metric tons to domestic cement sources.



The Long-Term Source Gap

The lack of significant expansion in domestic capacity is expected to materialize in the context of large population gains, sustained economic growth, and new demands for concrete resulting from green building and energy needs. The potential exists that the gap between domestic cement sourcing and domestic cement consumption could approach nearly 60 million metric tons by 2040.

The cement industry's sourcing capability to meet potential cement consumption could begin to show stress during 2020-2025. By that time, consumption will be approaching full recovery from the cyclical downturn. The combination of improved consumption and relatively stable domestic capacity

levels pushes domestic kiln capacity to 90% – a level assumed to be the maximum sustained potential operating rate. Further increases in market consumption are expected to be met by increased reliance on imports. Import terminal capacity is estimated at 45 million metric tons. Imports, according to this scenario, exceed 22 million metric tons by 2020.

By 2030, PCA estimates that the utilization rate among domestic plants and import terminals will average 90%. This represents a theoretical maximum. Constraints, according to this scenario, choke further gains in consumption. Avoidance of this and closing the source gap will require building new plants or expanding import terminal capacity, or a combination of both strategies. Sourcing decisions for the United States' market are likely to be made in the context of climate change legislation, sustained high energy costs, higher international freight rates, and moderate economic growth among the world's transitional and emerging economies.

If a pure domestic strategy is undertaken to close the 30 million metric ton source gap, as many as 15 new cement plants with two million tons of capacity would have to be constructed during the 2030-2040 time period. At roughly $250 to $300 per ton of capacity, each plant could cost as much as $500 to $600 million. The entire investment (15 plants) could total as high as $9 billion.

If a pure import strategy is undertaken, 45 new import terminals would have to be constructed (or more than two per year) during 2020-2040. PCA assumes the average import silo is roughly 60,000 tons at 11 turns annually for an average annual throughput capacity of 660,000 metric tons. Such a scenario implies that the import share would exceed 40%. This assumes no gains in terminal productivity and all expansion comes from new terminals. Such an expansion in import terminals equates to roughly $300 to $325 million in investment.

Appendix

Gross State Product

- Real 2009 $, Billions

Model	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	Growth 2015-2040	CAGR 2015-2040
Alabama	84	97	111	130	150	173	173	183	197	218	241	265	291	109	1.9%
Arizona	69	88	104	143	203	251	245	261	312	369	434	514	607	346	3.4%
Arkansas	45	52	59	74	86	99	103	112	125	135	145	155	166	54	1.6%
California	766	942	1,186	1,233	1,653	1,902	1,932	2,207	2,513	2,802	3,108	3,457	3,829	1,622	2.2%
Colorado	91	108	118	156	219	240	253	289	330	370	410	460	514	225	2.3%
Connecticut	102	130	160	170	207	230	228	230	256	275	296	319	346	115	1.6%
Delaware	22	28	36	42	50	57	57	60	69	75	82	91	100	40	2.1%
District Of Columbia	68	69	78	76	80	93	102	108	116	129	143	155	169	61	1.8%
Florida	254	334	423	499	616	773	722	790	959	1,128	1,301	1,477	1,636	846	3.0%
Georgia	137	184	225	286	375	414	404	442	508	574	641	715	791	349	2.4%
Hawaii	36	41	54	55	53	64	67	71	77	84	91	99	107	36	1.7%
Idaho	19	20	24	33	46	52	55	58	68	78	88	100	113	54	2.7%
Illinois	348	384	446	517	613	649	646	690	743	801	858	918	985	295	1.4%
Indiana	134	148	173	207	252	271	280	299	343	380	417	458	502	204	2.1%
Iowa	72	73	83	98	117	136	140	155	168	184	200	218	238	83	1.7%
Kansas	65	73	82	91	108	117	126	133	145	157	170	185	200	68	1.7%
Kentucky	84	93	107	129	145	160	163	173	192	211	232	257	284	111	2.0%
Louisiana	139	148	159	174	183	216	220	213	224	238	251	267	283	70	1.1%
Maine	26	31	38	39	46	51	51	50	53	57	60	64	68	17	1.2%
Maryland	129	156	192	204	243	292	311	327	359	391	426	465	505	179	1.8%
Massachusetts	167	213	249	267	348	375	396	428	476	528	585	647	708	280	2.0%
Michigan	253	289	313	360	421	433	385	419	457	486	516	548	583	164	1.3%
Minnesota	112	136	157	182	237	268	268	299	334	369	401	436	475	176	1.9%
Mississippi	47	53	60	75	83	90	93	95	101	108	116	124	132	36	1.3%
Missouri	130	149	170	201	234	249	253	262	289	315	341	368	396	135	1.7%
Montana	21	21	22	26	29	34	37	41	46	51	56	61	68	27	2.0%
Nebraska	41	46	52	62	72	82	90	101	114	126	140	155	172	71	2.2%
Nevada	31	37	53	73	99	131	119	126	149	168	187	209	232	106	2.5%
New Hampshire	20	28	35	41	54	62	62	66	72	79	87	95	105	40	1.9%
New Jersey	227	288	357	384	449	493	488	508	563	602	646	703	759	251	1.6%
New Mexico	32	36	38	57	69	79	83	86	93	103	114	127	142	56	2.0%
New York	627	724	829	849	1,008	1,118	1,192	1,266	1,362	1,454	1,550	1,659	1,766	500	1.3%
North Carolina	148	185	224	275	341	393	414	442	512	592	681	783	900	457	2.9%
North Dakota	15	17	17	20	23	27	35	50	58	66	75	85	95	45	2.6%
Ohio	280	319	359	414	481	513	488	544	601	653	705	760	816	272	1.6%
Oklahoma	82	92	91	101	118	133	145	171	188	208	230	255	282	110	2.0%
Oregon	59	61	74	93	132	154	191	199	243	285	331	384	443	243	3.2%
Pennsylvania	317	344	405	452	517	560	581	627	685	738	790	843	897	271	1.4%
Rhode Island	24	29	35	36	43	50	49	51	55	60	65	70	76	25	1.6%
South Carolina	66	82	104	123	146	161	164	177	206	232	260	289	320	143	2.4%
South Dakota	13	15	17	22	27	33	37	41	46	51	56	61	67	26	2.0%
Tennessee	105	126	148	189	224	252	252	280	316	348	383	422	464	184	2.0%
Texas	451	537	594	722	945	1,058	1,205	1,476	1,657	1,898	2,169	2,484	2,840	1,364	2.7%
Utah	37	45	51	67	87	103	117	131	158	180	205	234	266	135	2.9%
Vermont	11	13	17	18	22	26	26	27	29	31	34	36	39	12	1.5%
Virginia	160	196	245	274	337	396	420	432	489	539	593	653	722	290	2.1%
Washington	144	160	208	235	299	326	358	397	458	512	567	631	702	305	2.3%
West Virginia	41	42	46	54	58	61	65	67	73	79	85	91	97	30	1.5%
Wisconsin	122	135	158	189	225	251	252	274	302	329	357	388	422	148	1.7%
Wyoming	19	19	20	22	25	30	36	35	41	45	50	54	59	24	2.1%
Total	**6,491**	**7,634**	**9,007**	**10,239**	**12,596**	**14,180**	**14,578**	**15,969**	**17,930**	**19,890**	**21,966**	**24,294**	**26,778**	**10,809**	**2.1%**

Cement Consumption

- Thousands of Metric Tons

(Portland + Masonry)

Model	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	Growth 2015-2040	CAGR 2015-2040
Alabama	1,109	1,275	1,469	1,511	1,710	1,920	1,080	1,066	1,396	1,573	1,708	1,898	2,061	995	2.7%
Arizona	1,293	1,865	1,763	2,267	3,345	4,772	1,499	1,944	2,572	3,630	4,795	5,680	6,560	4,616	5.0%
Arkansas	731	739	767	993	1,007	1,302	795	851	1,047	1,201	1,322	1,410	1,409	558	2.0%
California	7,467	9,064	10,439	8,103	13,096	16,010	6,359	9,638	12,546	13,797	15,454	17,417	17,965	8,326	2.5%
Colorado	1,299	1,449	1,001	1,665	2,640	2,552	1,474	2,099	2,737	3,185	3,608	3,941	4,282	2,183	2.9%
Connecticut	574	804	655	620	853	818	479	595	706	760	820	864	826	231	1.3%
Delaware	126	184	245	232	176	222	177	236	234	262	289	307	300	64	1.0%
District Of Columbia	110	106	221	108	179	206	110	238	245	274	296	304	311	73	1.1%
Florida	5,177	5,770	6,130	6,237	8,284	12,354	3,768	6,341	9,040	10,902	12,838	14,590	15,649	9,308	3.7%
Georgia	2,002	2,815	2,646	3,261	3,736	4,751	1,821	2,769	3,931	4,563	5,153	5,680	5,803	3,034	3.0%
Hawaii	340	200	494	363	293	437	264	409	436	477	530	563	576	167	1.4%
Idaho	330	215	318	464	559	706	386	498	606	725	846	917	917	419	2.5%
Illinois	2,416	2,546	3,475	3,402	3,922	4,637	2,456	3,119	3,666	4,162	4,754	4,898	4,717	1,598	1.7%
Indiana	1,275	1,287	1,782	1,955	2,304	2,274	1,516	1,926	2,194	2,466	2,720	2,874	2,980	1,054	1.8%
Iowa	1,197	988	1,256	1,448	1,718	1,938	1,431	1,896	2,045	2,081	2,099	2,041	1,983	87	0.2%
Kansas	1,113	1,189	1,077	1,355	1,505	1,549	1,177	1,306	1,507	1,734	1,956	2,074	2,120	814	2.0%
Kentucky	937	987	1,110	1,287	1,420	1,604	896	1,169	1,383	1,569	1,755	1,795	1,833	664	1.8%
Louisiana	2,446	2,254	1,729	1,809	1,844	2,231	2,791	2,203	2,156	2,312	2,432	2,418	2,384	181	0.3%
Maine	209	266	256	215	226	239	187	195	225	245	265	272	269	74	1.3%
Maryland	1,277	1,440	1,513	1,171	1,421	1,659	961	1,263	1,407	1,572	1,755	1,890	1,883	620	1.6%
Massachusetts	902	1,283	945	1,062	1,603	1,264	689	938	1,063	1,206	1,313	1,385	1,350	412	1.5%
Michigan	1,896	2,104	2,536	2,855	3,649	3,059	1,593	2,023	2,417	2,666	2,942	3,008	2,997	974	1.6%
Minnesota	1,361	1,181	1,515	1,617	2,047	2,055	1,212	1,661	1,997	2,263	2,495	2,622	2,655	995	1.9%
Mississippi	835	739	745	919	993	1,136	814	732	874	977	1,037	1,088	1,113	382	1.7%
Missouri	1,330	1,609	1,829	2,292	2,605	2,868	1,579	1,655	2,129	2,368	2,594	2,784	2,800	1,145	2.1%
Montana	266	173	170	278	319	381	259	313	351	413	466	498	514	200	2.0%
Nebraska	763	724	797	996	1,088	1,368	989	1,309	1,430	1,562	1,682	1,788	1,894	584	1.5%
Nevada	513	577	1,110	1,484	1,994	2,628	865	1,138	1,687	2,082	2,544	3,017	3,249	2,111	4.3%
New Hampshire	204	353	235	263	274	234	193	207	234	265	299	335	358	151	2.2%
New Jersey	1,406	1,642	1,517	1,466	1,988	2,057	1,162	1,481	1,689	1,914	2,140	2,251	2,182	702	1.6%
New Mexico	554	571	495	715	837	908	608	506	599	704	799	890	994	488	2.7%
New York	2,224	2,786	2,933	2,429	3,309	3,288	2,375	2,924	3,146	3,385	3,522	3,570	3,600	676	0.8%
North Carolina	1,472	1,851	2,107	2,492	3,084	3,251	1,707	2,176	3,134	3,642	4,106	4,567	4,919	2,744	3.3%
North Dakota	255	270	182	324	311	361	408	1,041	896	821	742	700	719	-322	-1.5%
Ohio	2,541	2,517	3,313	3,731	4,097	4,064	2,423	3,218	3,846	4,265	4,510	4,621	4,574	1,357	1.4%
Oklahoma	1,534	1,237	923	1,153	1,465	1,674	1,472	1,651	1,759	1,956	2,090	2,201	2,293	643	1.3%
Oregon	755	641	829	1,028	1,003	1,237	610	770	992	1,161	1,296	1,416	1,539	769	2.8%
Pennsylvania	2,384	2,719	3,205	2,930	3,506	3,437	2,489	2,837	3,395	3,764	3,977	3,993	4,002	1,165	1.4%
Rhode Island	118	154	154	120	158	191	94	96	119	138	160	171	171	75	2.3%
South Carolina	897	1,033	1,179	1,143	1,457	1,944	991	1,453	1,942	2,320	2,685	2,938	3,129	1,676	3.1%
South Dakota	238	273	277	306	435	485	447	478	522	601	670	716	752	274	1.8%
Tennessee	1,360	1,481	1,610	2,002	2,320	2,521	1,332	1,597	2,188	2,521	2,831	3,001	3,030	1,433	2.6%
Texas	8,017	9,782	6,945	8,597	11,869	15,089	10,336	14,623	17,921	20,142	22,008	23,893	25,421	10,798	2.2%
Utah	726	944	694	1,295	1,433	1,526	1,022	1,226	1,544	1,771	2,034	2,332	2,660	1,434	3.1%
Vermont	117	158	111	108	149	131	105	100	117	132	148	162	164	65	2.0%
Virginia	1,760	2,080	2,108	1,894	2,372	2,869	1,452	1,737	2,226	2,542	2,858	3,008	2,962	1,225	2.2%
Washington	1,268	1,103	1,611	1,677	2,019	2,239	1,321	1,750	2,138	2,488	2,915	3,231	3,370	1,620	2.7%
West Virginia	532	383	428	443	443	539	438	423	434	502	527	541	531	108	0.9%
Wisconsin	1,441	1,204	1,679	1,879	2,218	2,374	1,440	1,885	2,134	2,394	2,632	2,858	2,871	986	1.7%
Wyoming	437	381	235	216	248	465	322	346	358	421	475	514	530	184	1.7%
Total	**69,537**	**77,398**	**80,765**	**86,176**	**109,527**	**127,825**	**70,374**	**92,054**	**113,361**	**128,876**	**143,892**	**155,931**	**162,169**	**70,115**	**2.3%**

Population

- Thousands of Persons, Mid Year

Model	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	Growth 2015-2040	CAGR 2015-2040
Alabama	3,903	3,973	4,050	4,297	4,452	4,570	4,785	4,859	4,916	5,039	5,188	5,320	5,437	578	0.5%
Arizona	2,736	3,184	3,684	4,432	5,161	5,839	6,408	6,828	7,570	8,374	9,262	10,212	11,211	4,383	2.0%
Arkansas	2,290	2,327	2,357	2,535	2,679	2,781	2,922	2,978	3,039	3,093	3,133	3,151	3,148	169	0.2%
California	23,797	26,441	29,960	31,697	33,988	35,828	37,334	39,145	40,819	42,509	44,162	45,801	47,241	8,096	0.8%
Colorado	2,910	3,209	3,308	3,827	4,327	4,632	5,048	5,457	5,832	6,166	6,476	6,758	7,020	1,564	1.0%
Connecticut	3,112	3,201	3,292	3,324	3,412	3,507	3,580	3,591	3,601	3,629	3,645	3,643	3,629	38	0.0%
Delaware	595	618	670	730	786	845	900	946	988	1,029	1,068	1,103	1,136	190	0.7%
District Of Columbia	638	635	605	581	572	567	605	672	702	725	747	766	783	111	0.6%
Florida	9,841	11,351	13,033	14,538	16,048	17,842	18,850	20,271	22,512	24,754	26,944	28,932	30,398	10,127	1.6%
Georgia	5,487	5,963	6,513	7,328	8,227	8,926	9,713	10,215	11,040	11,798	12,505	13,150	13,714	3,499	1.2%
Hawaii	968	1,040	1,113	1,197	1,214	1,293	1,364	1,432	1,485	1,536	1,586	1,628	1,666	234	0.6%
Idaho	949	994	1,012	1,177	1,299	1,428	1,571	1,655	1,746	1,828	1,907	1,983	2,056	401	0.9%
Illinois	11,442	11,400	11,453	12,008	12,434	12,610	12,841	12,860	12,853	12,848	12,836	12,815	12,784	-76	0.0%
Indiana	5,492	5,459	5,558	5,851	6,092	6,279	6,491	6,620	6,747	6,869	6,964	7,043	7,103	483	0.3%
Iowa	2,916	2,830	2,781	2,867	2,929	2,964	3,051	3,124	3,135	3,145	3,145	3,140	3,133	9	0.0%
Kansas	2,370	2,427	2,481	2,601	2,694	2,745	2,859	2,912	3,003	3,104	3,196	3,278	3,351	440	0.6%
Kentucky	3,665	3,695	3,694	3,887	4,049	4,183	4,348	4,425	4,508	4,618	4,728	4,836	4,938	513	0.4%
Louisiana	4,227	4,408	4,222	4,379	4,472	4,577	4,545	4,671	4,736	4,781	4,819	4,845	4,859	188	0.2%
Maine	1,128	1,163	1,232	1,243	1,277	1,319	1,328	1,329	1,329	1,328	1,321	1,312	1,300	-29	-0.1%
Maryland	4,227	4,413	4,800	5,070	5,311	5,592	5,788	6,006	6,186	6,373	6,547	6,708	6,856	850	0.5%
Massachusetts	5,743	5,881	6,023	6,141	6,361	6,403	6,565	6,794	6,976	7,162	7,344	7,514	7,665	871	0.5%
Michigan	9,256	9,076	9,311	9,676	9,952	10,051	9,877	9,923	9,917	9,898	9,881	9,859	9,821	-101	0.0%
Minnesota	4,085	4,184	4,390	4,660	4,934	5,120	5,311	5,490	5,650	5,806	5,937	6,034	6,111	621	0.4%
Mississippi	2,527	2,588	2,579	2,723	2,848	2,906	2,970	2,992	3,015	3,049	3,079	3,100	3,113	121	0.2%
Missouri	4,923	5,000	5,129	5,378	5,607	5,790	5,996	6,084	6,201	6,306	6,385	6,440	6,478	394	0.3%
Montana	789	822	800	877	904	940	991	1,033	1,072	1,111	1,149	1,187	1,224	191	0.7%
Nebraska	1,573	1,585	1,582	1,657	1,714	1,761	1,830	1,896	1,955	2,010	2,060	2,101	2,136	240	0.5%
Nevada	810	951	1,221	1,582	2,019	2,432	2,703	2,891	3,213	3,555	3,894	4,223	4,548	1,657	1.8%
New Hampshire	924	997	1,112	1,158	1,240	1,298	1,317	1,331	1,349	1,372	1,395	1,418	1,442	111	0.3%
New Jersey	7,376	7,566	7,763	8,083	8,431	8,652	8,804	8,958	9,025	9,063	9,121	9,253	9,326	368	0.2%
New Mexico	1,310	1,438	1,522	1,720	1,821	1,932	2,065	2,085	2,130	2,205	2,284	2,359	2,441	356	0.6%
New York	17,565	17,792	18,021	18,524	19,002	19,133	19,403	19,796	19,889	19,919	19,945	19,946	19,861	65	0.0%
North Carolina	5,898	6,254	6,664	7,345	8,082	8,705	9,559	10,043	10,870	11,844	12,790	13,663	14,418	4,375	1.5%
North Dakota	655	677	638	648	642	646	675	757	790	820	848	874	898	141	0.7%
Ohio	10,803	10,735	10,864	11,203	11,364	11,463	11,541	11,613	11,669	11,698	11,685	11,619	11,502	-111	0.0%
Oklahoma	3,043	3,271	3,149	3,308	3,454	3,549	3,760	3,911	4,045	4,175	4,295	4,401	4,495	584	0.6%
Oregon	2,642	2,673	2,860	3,184	3,430	3,613	3,838	4,029	4,208	4,385	4,554	4,713	4,862	833	0.8%
Pennsylvania	11,873	11,771	11,903	12,198	12,284	12,450	12,712	12,803	12,790	12,751	12,716	12,645	12,562	-241	-0.1%
Rhode Island	949	969	1,006	1,017	1,050	1,068	1,053	1,056	1,066	1,076	1,083	1,090	1,095	38	0.1%
South Carolina	3,135	3,303	3,501	3,749	4,024	4,270	4,636	4,896	5,209	5,527	5,829	6,069	6,268	1,372	1.0%
South Dakota	691	698	697	738	756	775	816	858	888	916	943	966	987	128	0.6%
Tennessee	4,603	4,715	4,894	5,327	5,704	5,991	6,357	6,600	6,867	7,125	7,362	7,572	7,761	1,161	0.7%
Texas	14,339	16,273	17,057	18,959	20,944	22,778	25,244	27,469	29,782	32,134	34,521	36,958	39,321	11,852	1.4%
Utah	1,473	1,643	1,731	2,014	2,245	2,458	2,775	2,996	3,222	3,446	3,666	3,883	4,094	1,098	1.3%
Vermont	513	530	565	589	610	621	626	626	634	641	648	655	662	36	0.2%
Virginia	5,368	5,715	6,212	6,666	7,106	7,577	8,026	8,383	8,704	9,023	9,320	9,588	9,831	1,448	0.6%
Washington	4,155	4,400	4,903	5,481	5,911	6,257	6,743	7,170	7,620	8,034	8,427	8,817	9,197	2,026	1.0%
West Virginia	1,953	1,907	1,793	1,824	1,807	1,820	1,854	1,844	1,830	1,817	1,795	1,766	1,732	-112	-0.2%
Wisconsin	4,714	4,748	4,905	5,185	5,374	5,546	5,690	5,771	5,871	5,966	6,040	6,088	6,115	343	0.2%
Wyoming	475	500	454	485	494	514	565	586	605	624	641	656	669	83	0.5%
Total	**226,850**	**237,391**	**249,065**	**265,669**	**281,534**	**294,850**	**308,633**	**320,680**	**333,808**	**347,004**	**359,811**	**371,880**	**382,398**	**61,717**	**0.7%**

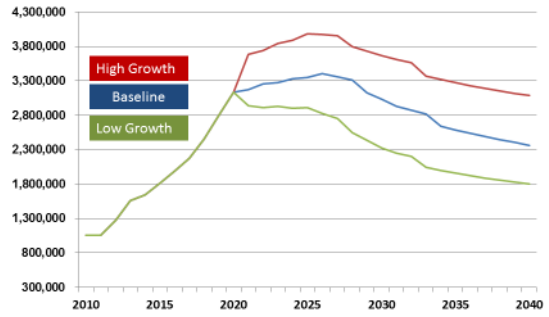
Per Capita Cement Consumption

- Metric Tons Consumed Per Person

	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	Growth 2015-2040	CAGR 2015-2040
Alabama	0.284	0.321	0.363	0.352	0.384	0.420	0.226	0.219	0.284	0.312	0.329	0.357	0.379	0.160	2.2%
Arizona	0.473	0.586	0.478	0.511	0.648	0.817	0.234	0.285	0.340	0.433	0.518	0.556	0.585	0.300	2.9%
Arkansas	0.319	0.318	0.326	0.392	0.376	0.468	0.272	0.286	0.344	0.388	0.422	0.448	0.448	0.162	1.8%
California	0.314	0.343	0.348	0.256	0.385	0.447	0.170	0.246	0.307	0.325	0.350	0.380	0.380	0.134	1.8%
Colorado	0.446	0.452	0.303	0.435	0.610	0.551	0.292	0.385	0.469	0.517	0.557	0.583	0.610	0.225	1.9%
Connecticut	0.185	0.251	0.199	0.186	0.250	0.233	0.134	0.166	0.196	0.209	0.225	0.237	0.228	0.062	1.3%
Delaware	0.212	0.297	0.366	0.318	0.224	0.263	0.196	0.250	0.237	0.255	0.271	0.279	0.264	0.015	0.2%
District Of Columbia	0.172	0.168	0.365	0.185	0.314	0.363	0.181	0.354	0.349	0.377	0.397	0.397	0.397	0.042	0.5%
Florida	0.526	0.508	0.470	0.429	0.516	0.692	0.200	0.313	0.402	0.440	0.476	0.504	0.515	0.202	2.0%
Georgia	0.365	0.472	0.406	0.445	0.454	0.532	0.187	0.271	0.356	0.387	0.412	0.432	0.423	0.152	1.8%
Hawaii	0.351	0.192	0.444	0.304	0.241	0.338	0.194	0.286	0.293	0.311	0.334	0.346	0.346	0.060	0.8%
Idaho	0.348	0.216	0.314	0.394	0.430	0.494	0.246	0.301	0.347	0.397	0.444	0.463	0.446	0.145	1.6%
Illinois	0.211	0.223	0.303	0.283	0.315	0.368	0.191	0.243	0.285	0.324	0.370	0.382	0.369	0.126	1.7%
Indiana	0.232	0.236	0.321	0.334	0.378	0.362	0.234	0.291	0.325	0.359	0.391	0.408	0.419	0.129	1.5%
Iowa	0.411	0.349	0.452	0.505	0.587	0.654	0.469	0.607	0.652	0.662	0.667	0.650	0.633	0.026	0.2%
Kansas	0.470	0.490	0.434	0.521	0.559	0.564	0.412	0.448	0.502	0.559	0.612	0.633	0.633	0.184	1.4%
Kentucky	0.256	0.267	0.300	0.331	0.351	0.383	0.206	0.264	0.307	0.340	0.371	0.371	0.371	0.107	1.4%
Louisiana	0.579	0.511	0.409	0.413	0.412	0.487	0.614	0.472	0.455	0.484	0.505	0.499	0.491	0.019	0.2%
Maine	0.185	0.229	0.208	0.173	0.177	0.182	0.141	0.147	0.169	0.185	0.201	0.207	0.207	0.060	1.4%
Maryland	0.302	0.326	0.315	0.231	0.267	0.297	0.166	0.210	0.227	0.247	0.268	0.282	0.275	0.064	1.1%
Massachusetts	0.157	0.218	0.157	0.173	0.252	0.197	0.105	0.138	0.152	0.168	0.179	0.184	0.176	0.038	1.0%
Michigan	0.205	0.232	0.272	0.295	0.367	0.304	0.161	0.204	0.244	0.269	0.298	0.305	0.305	0.101	1.6%
Minnesota	0.333	0.282	0.345	0.347	0.415	0.401	0.228	0.303	0.353	0.390	0.420	0.435	0.435	0.132	1.5%
Mississippi	0.331	0.286	0.289	0.338	0.348	0.391	0.274	0.245	0.290	0.320	0.337	0.351	0.358	0.113	1.5%
Missouri	0.270	0.322	0.357	0.426	0.464	0.495	0.263	0.272	0.343	0.375	0.406	0.432	0.432	0.160	1.9%
Montana	0.337	0.211	0.212	0.317	0.353	0.406	0.262	0.303	0.327	0.372	0.405	0.420	0.420	0.116	1.3%
Nebraska	0.485	0.457	0.504	0.601	0.635	0.777	0.540	0.691	0.732	0.777	0.817	0.851	0.887	0.196	1.0%
Nevada	0.633	0.607	0.909	0.938	0.988	1.081	0.320	0.394	0.525	0.586	0.653	0.714	0.714	0.321	2.4%
New Hampshire	0.221	0.355	0.212	0.227	0.221	0.180	0.147	0.155	0.174	0.193	0.214	0.236	0.248	0.093	1.9%
New Jersey	0.191	0.217	0.195	0.181	0.236	0.238	0.132	0.165	0.187	0.211	0.235	0.243	0.234	0.069	1.4%
New Mexico	0.423	0.397	0.325	0.415	0.460	0.470	0.294	0.243	0.281	0.319	0.350	0.377	0.407	0.165	2.1%
New York	0.127	0.157	0.163	0.131	0.174	0.172	0.122	0.148	0.158	0.170	0.177	0.179	0.181	0.034	0.8%
North Carolina	0.249	0.296	0.316	0.339	0.382	0.373	0.179	0.217	0.288	0.308	0.321	0.334	0.341	0.125	1.8%
North Dakota	0.389	0.399	0.286	0.500	0.485	0.558	0.604	1.375	1.134	1.001	0.875	0.801	0.801	-0.574	-2.1%
Ohio	0.235	0.234	0.305	0.333	0.361	0.355	0.210	0.277	0.330	0.365	0.386	0.398	0.398	0.121	1.5%
Oklahoma	0.504	0.378	0.293	0.348	0.424	0.472	0.392	0.422	0.435	0.468	0.487	0.500	0.510	0.088	0.8%
Oregon	0.286	0.240	0.290	0.323	0.293	0.342	0.159	0.191	0.236	0.265	0.284	0.300	0.317	0.125	2.0%
Pennsylvania	0.201	0.231	0.269	0.240	0.285	0.276	0.196	0.222	0.265	0.295	0.313	0.316	0.319	0.097	1.5%
Rhode Island	0.125	0.158	0.153	0.118	0.150	0.179	0.089	0.091	0.112	0.128	0.148	0.157	0.157	0.066	2.2%
South Carolina	0.286	0.313	0.337	0.305	0.362	0.455	0.214	0.297	0.373	0.420	0.461	0.484	0.499	0.202	2.1%
South Dakota	0.344	0.390	0.398	0.415	0.576	0.625	0.548	0.556	0.589	0.656	0.711	0.741	0.762	0.206	1.3%
Tennessee	0.296	0.314	0.329	0.376	0.407	0.421	0.210	0.242	0.319	0.354	0.385	0.396	0.390	0.148	1.9%
Texas	0.559	0.601	0.407	0.453	0.567	0.662	0.409	0.532	0.602	0.627	0.638	0.646	0.646	0.114	0.8%
Utah	0.493	0.575	0.401	0.643	0.638	0.621	0.368	0.409	0.479	0.514	0.555	0.601	0.650	0.241	1.9%
Vermont	0.229	0.299	0.197	0.183	0.244	0.211	0.167	0.159	0.185	0.205	0.228	0.248	0.248	0.089	1.8%
Virginia	0.328	0.364	0.339	0.284	0.334	0.379	0.181	0.207	0.256	0.282	0.307	0.314	0.301	0.094	1.5%
Washington	0.305	0.251	0.329	0.306	0.342	0.358	0.196	0.244	0.281	0.310	0.346	0.366	0.366	0.122	1.6%
West Virginia	0.272	0.201	0.239	0.243	0.245	0.296	0.236	0.230	0.237	0.276	0.294	0.306	0.306	0.077	1.2%
Wisconsin	0.306	0.254	0.342	0.362	0.413	0.428	0.253	0.327	0.363	0.401	0.436	0.469	0.469	0.143	1.5%
Wyoming	0.920	0.763	0.517	0.446	0.502	0.905	0.571	0.590	0.592	0.675	0.741	0.783	0.792	0.202	1.2%
Total	**0.307**	**0.326**	**0.324**	**0.324**	**0.389**	**0.434**	**0.228**	**0.287**	**0.340**	**0.371**	**0.400**	**0.419**	**0.424**	**0.137**	**1.6%**

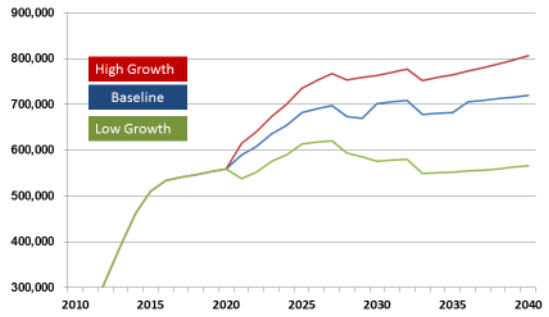
SINGLE FAMILY OUTLOOK

THOUSAND SQUARE FOOTAGE



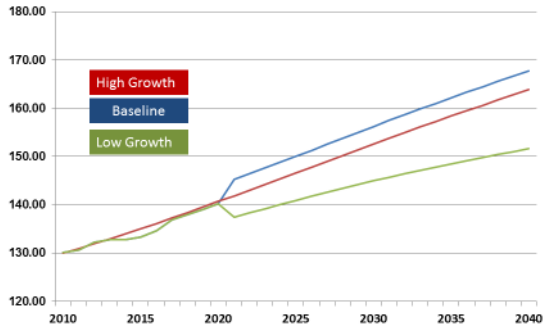
MULTIFAMILY OUTLOOK

THOUSAND SQUARE FOOTAGE



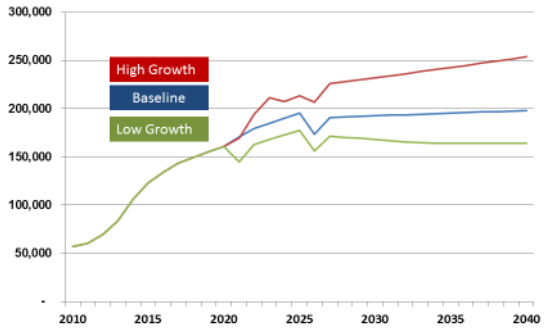
HOUSING STOCK OUTLOOK

THOUSAND UNITS



OFFICE OUTLOOK

THOUSAND SQUARE FOOTAGE



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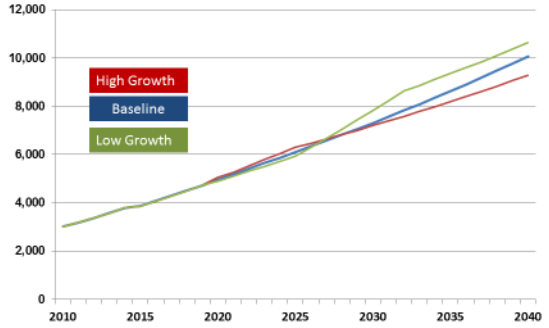
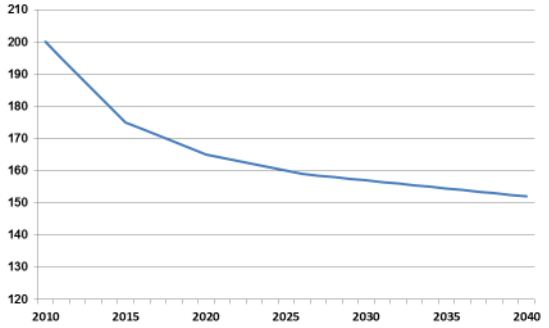
TELE-COMMUTER OFFICE WORKERS

HUNDREDS OF EMPLOYEES



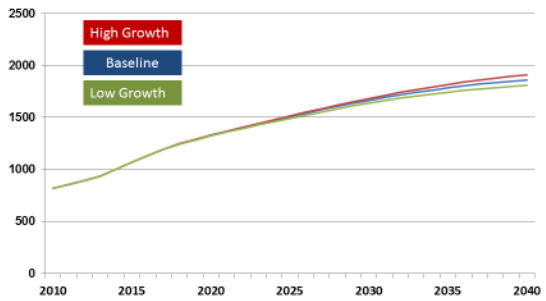
OFFICE OUTLOOK

SQUARE FOOTAGE PER EMPLOYEE



MEDICAL OUTPATIENT VISITS OUTLOOK

MILLION VISITS

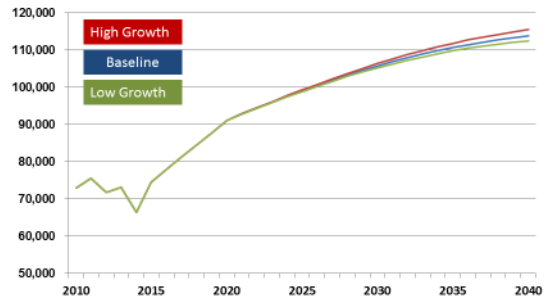


MEDICAL SEGMENT: SELECTED RESULTS

	Baseline	Low Growth	High Growth
SQFT (2040 Value, billion)	113.7	112.1	115.4
SQFT (Avg. growth rate)	1.7%	1.4%	2.2%
PIP (2040 Value, Billion)	36.0	35.4	36.6
Chg in Un-insured Pop. (2040 value, %)	-26.0%	-27.5%	-24.0%
Outpatient Visits (2040 value, billion)	1.8	1.7	1.9
Outpatient Visit Growth (2040/2016, %)	73.9%	68.3%	78.0%
Inpatient Visits (2040 value, million)	54.5	53.2	55.9
Inpatient Visit Growth (2040.2016, %)	30.0%	29.0%	33.0%

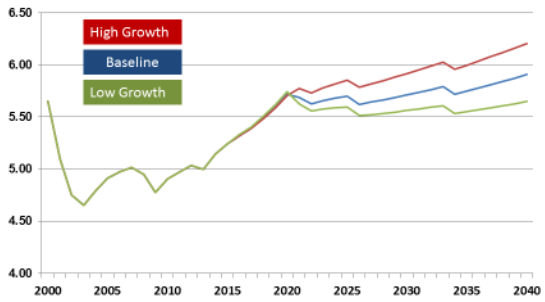
MEDICAL OUTLOOK

THOUSAND SQUARE FOOTAGE



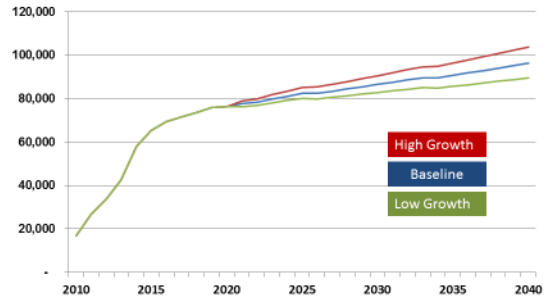
ANNUAL PERSONAL TRIPS PER CAPITA

TRIPS IN EXCESS OF 50 MILES PER PERSON



HOTEL & MOTEL OUTLOOK

THOUSAND SQUARE FOOTAGE



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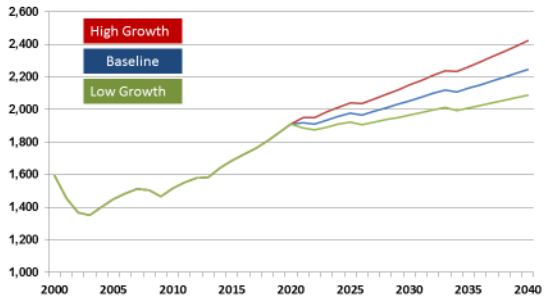
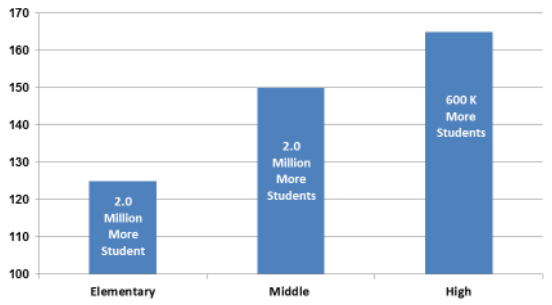
ANNUAL PERSONAL TRIPS

MILLION TRIPS IN EXCESS OF 50 MILES



SQUARE FEET PER STUDENT



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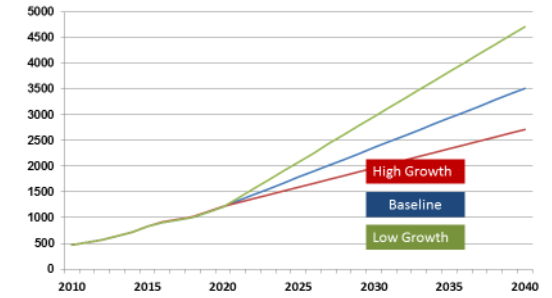
EDUCATION SEGMENT: SELECTED RESULTS

	Baseline	Low Growth	High Growth
Elementary Pop. Chg. (2040 value, million)	1.638	0.804	2.431
Mid-School Pop. Chg. (2040 value, million)	0.783	0.422	1.126
High School Pop Chg. (2040 value, millions)	0.867	0.381	1.330
College Pop Change (2040 value, millions)	0.525	0.026	0.999
College On-Line Share (2040 value, %)	20.0%	20.0%	20.0%
SQFT (2040 value, billion)	211.3	169.4	259.7
SQFT Growth Rate (average, %)	1.5%	0.6%	2.5%
SQFT Per Student (2040 value)	239	228	250

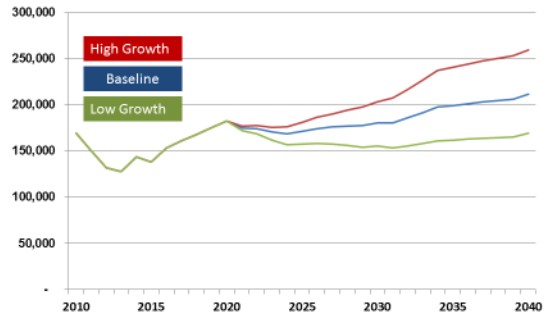
E-RETAIL OUTLOOK

$ BILLION



EDUCATION OUTLOOK

THOUSAND SQUARE FOOTAGE

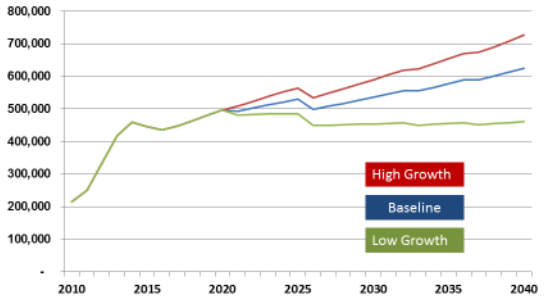


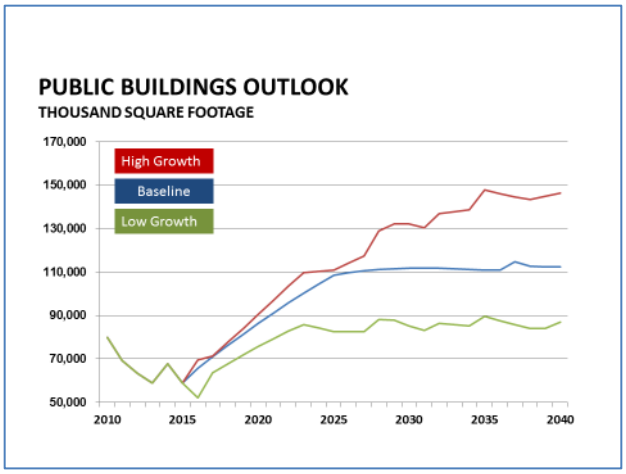
RETAIL SEGMENT: SELECTED RESULTS

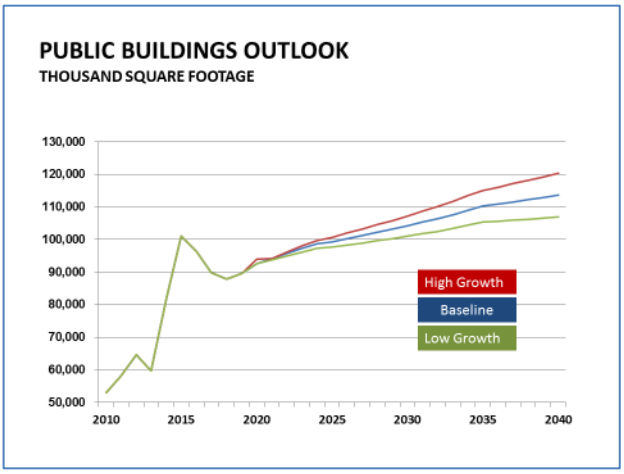
	Baseline	Low Growth	High Growth
SQFT Growth Rate (avg. growth)	1.9%	0.7%	2.5%
PIP (2040 value, billion)	76.3	56.4	88.6
Consumer Spending (2040 value, trillions)	20.1	18.4	21.9
On-Line Share (2040, value, %)	18.2%	35.0%	11.8%

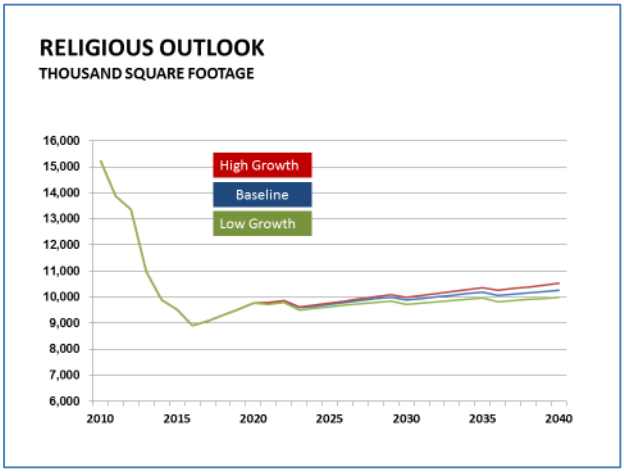
RETAIL OUTLOOK

THOUSAND SQUARE FOOTAGE




PUBLIC BUILDINGS OUTLOOK
THOUSAND SQUARE FOOTAGE
170,000
150,000
130,000
110,000
90,000
70,000
50,000
2010
2015
2020
2025
2030
2035
2040
High Growth
Baseline
Low Growth


PUBLIC BUILDINGS OUTLOOK
THOUSAND SQUARE FOOTAGE
130,000
120,000
110,000
100,000
90,000
80,000
70,000
60,000
50,000
2010
2015
2020
2025
2030
2035
2040
High Growth
Baseline
Low Growth


RELIGIOUS OUTLOOK
THOUSAND SQUARE FOOTAGE
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
2010
2015
2020
2025
2030
2035
2040
High Growth
Baseline
Low Growth