IncreMentalAdvantage

Fair Valuation of Siam Research and Innovation's PCC Patent Applications

The Fair Valuation of Siam Research and Innovation's PCC Patent Applications is Bt. 29.9 Million as of October 2, 2014

Report Date: October 2, 2014

The opinion of IncreMental Advantage, LLC in this Report is valid only for the stated purpose and as of the date of the Valuation.

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Exhibits

Appendices

October 2, 2014

Dr. Prinya Sainamthip
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DESCRIPTION OF THE ASSIGNMENT

IncreMental Advantage, LLC has been retained by Siam Research and Innovation Co., Ltd. ("SRI") to provide a Valuation of its two patent applications titled "Mixed Cement Formula Proving Compressive Strength Comparable to that of Portland Cement."

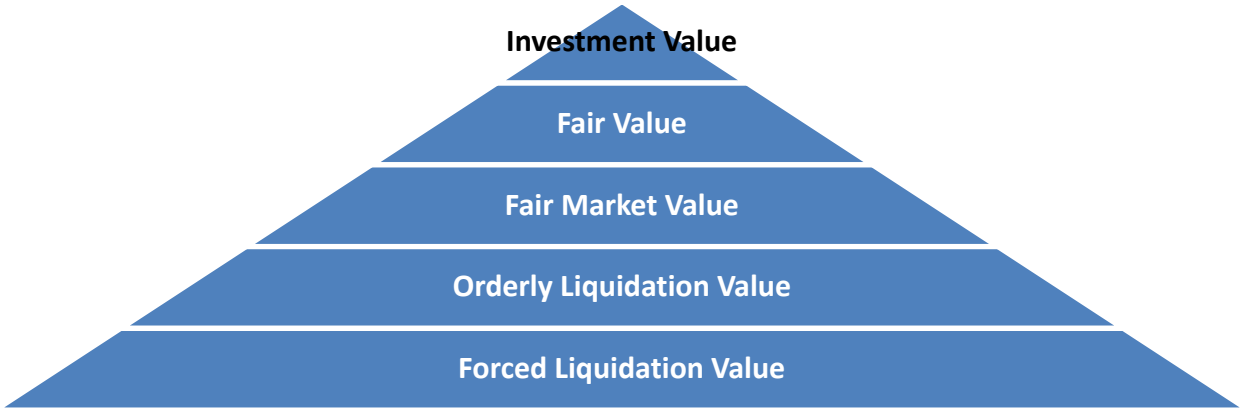
One of these patent applications was filed with the Department of Intellectual Property in Thailand on May 16, 2013. The related patent application number is 1301002571. The second patent application was filed in Cambodia on October 28, 2013 and that application number is 00065.

This Valuation assignment has been commissioned for purposes of determining the Fair Value of the aforementioned patent applications as of October 2, 2014. The date of this Valuation Report is October 2, 2014.

SELECTED STANDARDS OF VALUATION

As illustrated below, there are a multitude of Standards of Valuation, each of which applies to specific situations.

Hierarchy of Standards of Valuation



As it has been related to me, SRI wishes to learn the Value of the subject patent applications for internal reasons including to:

- Facilitate potential internal licensing initiatives;
- Provide evidence of the value of such patent applications in the event that SCG seeks to recover damages resulting from future patent infringement;

- Ensure appropriate alignment of research efforts with value created therefrom; and,
- Enhance corporate reporting practices

Thus, given the primary reasons behind the commissioning of this Patent Valuation Report, Fair Value is the most appropriate Standard of Valuation for assessing the subject patent applications.

DEFINITIONS OF STANDARDS OF VALUATION

Forced Liquidation Value "An opinion of the gross amount, expressed in terms of money, that typically could be realized from a properly advertised and conducted public auction, with the seller being compelled to sell with a sense of immediacy on an as-is, where-is basis, as of a specific date."[1]

Orderly Liquidation Value "An opinion of the gross amount, expressed in terms of money, that typically could be realized from a liquidation sale, given a reasonable period of time to find a purchaser (or purchasers), with the seller being compelled to sell on an as-is, where-is basis, as of a specific date."[2]

Fair Market Value "The price, expressed in terms of cash equivalents, at which property would change hands between a hypothetical willing and able buyer and a hypothetical willing and able seller, acting at arm's length in an open and unrestricted market, when neither is under compulsion to buy or sell and when both have reasonable knowledge of the relevant facts."[3]

Fair Value "…the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants in the market which would be the most advantageous for the asset or liability."[4] Fair Value can be more easily understood as Fair Market Value before discounts (primarily for lack of control and lack of marketability). Also, Fair Value is used to determine the value owed to a shareholder of a company that is being squeezed out.

Investment Value Investment value is the value of an asset to the owner or a prospective owner for individual investment or operational objectives.[5] Investment Value is also known as Strategic Value.

[1] Definitions of Value Relating to MTS Assets (http://www.appraisers.org/MTSHome/DefinitionsOfValue.aspx, number 10), the American Society of Appraisers

[2] Definitions of Value Relating to MTS Assets (http://www.appraisers.org/MTSHome/DefinitionsOfValue.aspx, number 9) American Society of Appraisers

[3] This definition is included in the International Glossary of Business Valuation Terms and has been adopted by American Institute of Certified Public Accountants, American Society of Appraisers, National Association of Certified Valuation Analysts, The Canadian Institute of Chartered Business Valuators, and The Institute of Business Appraisers.

[4] Financial Accounting Standards Board Accounting Standards Codification Topic 820 (ASC 820) definition of Fair Value.

[5] International Valuation Standards 2011

SUMMARY DESCRIPTION OF THE ASSETS VALUED

The scope of this Patent Valuation Report is limited to the aforementioned patent applications filed in Thailand and Cambodia. Other assets owned or controlled by Siam Cement—such as brand equity; trademarks; service marks; copyrights; know-how; trade secrets; regulatory approvals; employees; customer lists; goodwill; plant, property and equipment—were not considered as part of this Valuation.

In view of the above factors and among other considerations, the value of the technologies underlying the subject patent families as well as the enterprise value of Siam Cement could substantially exceed the value of the subject patent applications.

VALUATION METHODOLOGIES

In preparing this Valuation Report, I assessed the PCC patent applications based on the Cost Method, the Market Method and the Income Method. These are the three pillars of valuation. In applying the Income Method, I had to apply various tenets of the Market Method so as to insert a royalty rate into the income model. To do this, I reviewed comparable royalty rates as well as derived an implied royalty rate using a permutation of the Black-Scholes Method.

In reviewing the aforementioned patent applications, I considered issues such as point of novelty analysis; prior art analysis; priority dates; claims analysis; drawings analysis; chain of title analysis; quality of prosecuting lawyers; description analysis; abstract analysis; and, title analysis.

VALUATION CONCLUSION

The standard practice in the valuation profession is to present Conclusions of Value as of a specified date based on what is known or knowable. I do not believe the patent application in Cambodia has any value at this time. For the application in Thailand, the Cost Method suggests that Bt. 17.3 million is a reasonable valuation; the Market Method indicates a valuation of Bt. 38.3 million while the Income Method produces a valuation of Bt. 28.5 million. I weighted the valuation resulting from the Income Method most heavily because I believe that there is a relatively high degree of visibility into the cement industry. While applying three permutations of the Market Method and generating results in a tight range gave me comfort, I could find no truly compelling comparables. The Cost Method was of utility because it set a reasonable floor on the valuation.

I am not assigning any patent portfolio premium to the combined valuation of the two subject patent applications as there are not enough patent applications or children patents to award a patent portfolio premium. Thus, my Conclusion of Fair Valuation for the two PCC patent applications is Bt. 29.9 million as of October 2, 2014.

Siam Research and Innovation - PCC Patent Valuation October 2, 2014 Summary of Conclusions of Value				
PCC Patent Application (Thailand)	**Calculated Value**	**Rounded Value**	**Instant Weighting**	**Methodology Weighting**
Methodology				
Cost Method	**฿17,294,248**	**฿17,300,000**		**1**
Market Method	**฿38,257,692**	**฿38,300,000**		**2**
The Saraburi Acquisition Comparable	฿41,418,457	฿41,400,000	1	
Eastern European Comparables	฿38,477,311	฿38,500,000	1	
Cambodia Cement Chakrey Ting Factory Comparable	฿34,877,307	฿34,900,000	1	
Income Method	**฿28,524,786**	**฿28,500,000**		**3**
Conclusion of Value of PCC Patent Application (Thailand)	**฿29,897,331**	**฿29,900,000**		
Conclusion of Value of PCC Patent Application (Cambodia)	**฿0**	**฿0**		
Conclusion of Value of PCC Patent Applications (Thailand and Cambodia)	**฿29,897,331**	**฿29,900,000**		

USE OF THIS REPORT

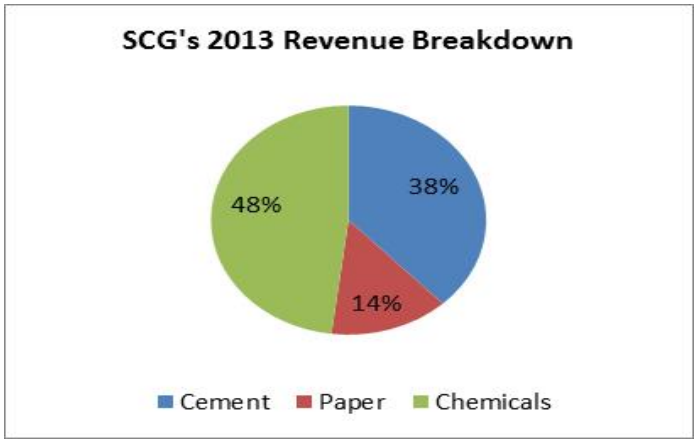
This report was prepared only for the purpose of determining the Fair Value of the aforementioned patent applications. This Valuation Report is as of October 2, 2014. No other use of this report—or assertions, opinions or conclusions contained therein—is permitted.

I remain,

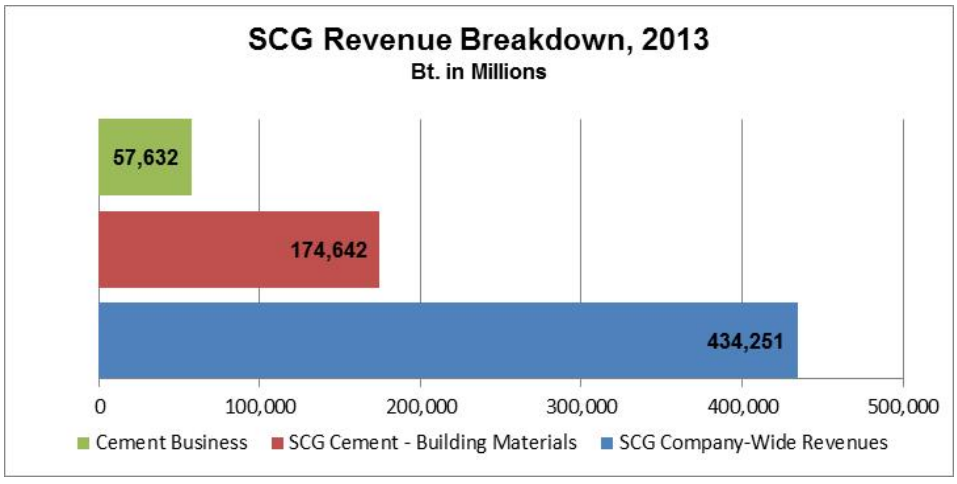
David Wanetick
Managing Director
IncreMental Advantage, LLC

THE SIAM CEMENT PUBLIC COMPANY LIMITED

The Siam Cement Public Company Limited ("SCG") was established in 1913 following a royal decree from Thailand's King Rama VI to produce cement in order to boost Thailand's development. SCG has since diversified into Paper and Chemicals, and has taken stakes in more than 100 related businesses. However, at 101 years old, the cement business is the longest running enterprise at SCG. In 2013, the SCG Cement – Building Materials ("SCG-CBM") division generated Bt. 174,642 million, or approximately 38% of SCG's company-wide revenues of Bt. 434,251 million.



SCG-CBM maintains the largest market share of cement in Thailand. Approximately 5,000 of SCG's roughly 50,000 employees are dedicated to the cement business. Cement generates roughly 33% of SCG-CBM's revenues, with the remainder of SCG-CBM's revenues coming from housing products (e.g. roofing and wood substitutes), ceramics, logistics, and trading.



It appears that SCG-CBM's performance is stronger that SCG's other business units as well as most of its regional competitors. As can be observed from the chart below, SCG's cement business is more profitable than SCG's paper and chemicals businesses.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
SCG Segmentation Analysis Based on 2013 Results

(Billions of Bahts)	Revenues	Percent of Company-Wide Revenues	EBITDA	EBITDA Margin	Profit	Profit Margin
Cement	174,642	38%	26,274	15.0%	16,092	9.2%
Paper	59,135	14%	9,473	16.0%	3,587	6.1%
Chemicals	209,997	48%	20,342	9.7%	11,292	5.4%

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
SCG Segmentation Analysis Based on First Half 2014 Results

(Billions of Bahts)	Revenues	Percent of Company-Wide Revenues	EBITDA	EBITDA Margin	Profit	Profit Margin
Cement	93,890	37.3%	10,556	11.2%	7,899	8.4%
Paper	31,809	12.6%	3,341	10.5%	2,450	7.7%
Chemicals	125,784	50.0%	6,662	5.3%	5,306	4.2%

Because SCG's chemicals business is the largest business unit as well as SCG's least profitable business, SCG's overall financial performance is restrained and, based on several measures indicated below, lags the performance of Siam City Cement. The strength of SCG's cement business is similarly obscured by SCG's less profitable business interests. Further, SCG's cement business may be at least equally as profitable and efficiently operated as that of Siam City Cement in light of:

- Siam City Cement being a purer play on cement;
- The SCG cement business controls more market share than Siam City; and,
- Siam City Cement is more focused on the cement market in Thailand, while SCG is aggressively investing in its cement operations outside of Thailand in locales such as Cambodia, Indonesia (2015), Myanmar (2016), and Laos (2017).

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Comparative Analysis of the Five Year Performance of Siam City Cement and SCG

Siam City Cement (SCCC)					
Period Ending	**12/30/2010**	**12/30/2011**	**12/28/2012**	**12/27/2013**	**9/12/2014**
	Bt. In Millions				
Market Capitalization	53,820	59,340	96,600	91,540	100,740
Siam City Cement (SCCC)					
Period Ending	**9/30/2010**	**9/30/2011**	**9/30/2012**	**9/30/2013**	**6/30/2014**
Book Value per Share (Baht)	69.5	72.8	73.5	80.3	91.4
	Bt. In Millions				
Revenue	21,418	23,734	26,960	30,329	16,735
Net Profit	2,701	3,293	3,636	4,796	3,375
Siam City Cement (SCCC)					
Financial Ratio Analysis					
ROA (%)	16.5%	19.8%	17.3%	20.4%	20.4%
ROE (%)	16.4%	19.6%	21.0%	26.0%	26.6%
Net Profit Margin (%)	12.6%	13.9%	13.5%	15.8%	20.2%

SCG (SCC)					
Period Ending	**12/30/2010**	**12/30/2011**	**12/28/2012**	**12/27/2013**	**9/12/2014**
	Bt. In Millions				
Market Capitalization	409,200	375,600	528,000	480,000	544,800
SCG (SCC)					
Period Ending	**9/30/2010**	**9/30/2011**	**9/30/2012**	**9/30/2013**	**6/30/2014**
Book Value per Share (Baht)	94.3	113.1	114.2	130.3	140
	Bt. In Millions				
Revenue	334,130	386,247	419,898	453,938	254,528
Net Profit	37,382	27,281	23,580	36,522	16,912
SCG (SCC)					
Financial Ratio Analysis					
ROA (%)	16.5%	10.2%	7.7%	12.2%	11.7%
ROE (%)	31.5%	20.0%	16.6%	24.0%	21.6%
Net Profit Margin (%)	11.9%	7.1%	5.6%	8.1%	6.6%

Summary of SCG's Five Year Performance Relative to Siam City

Five Year Average Performance	Siam City Cement	SCG	SCG's Relative Performance
Market Capitalization Growth	87.2%	33.1%	Negative
Book Value per Share Growth	31.5%	48.5%	Positive
Revenue Growth	56.3%	52.4%	Negative
Net Profit Growth	149.9%	-9.5%	Negative
Return-on-Assets, Five Year Average	18.9%	11.7%	Negative
Return-on-Equity, Five Year Average	21.9%	22.7%	Positive
Net Profit Margin, Five Year Average	15.2%	7.9%	Negative

Nevertheless, SCG has outperformed the ten Asian cement producers that the Financial Times indicated are close peers of SCG. (Please see the charts below.) Not only has SCG outperformed the average of its competitors in terms of revenues-per-employee, but SCG ranks number one on that metric. The market is rewarding SCG's strong performance with higher valuation multiples.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
SCG's Performance Relative to Ten Asian Cement Producers

Company	Market cap	Revenue (TTM)	Price / Sales (TTM)	Net Income (TTM)	Price / Earnings (TTM)	Price / Book Value	Employees	Revenues per Employee (TTM)
Artgo Mining Hldg Co Ltd	331,500,000	0	NA	0	NA	2.2	368	0
Asia Cement (China) Holdings Corp	1,093,300,000	1,322,100,000	0.8	156,000,000	7.0	0.7	4,660	283,712
China National Building Material Co. Ltd	5,193,500,000	20,150,000,000	0.3	1,014,000,000	5.1	0.9	135,000	149,259
China Rare Earth Holdings Limited	239,200,000	170,300,000	1.4	(179,400,000)	NA	0.6	1,000	170,300
China Resources Cement Holdings Limited	4,680,000,000	4,113,200,000	1.1	552,500,000	8.5	1.4	24,000	171,383
China Shanshui Cement Group Limited	1,105,000,000	2,757,300,000	0.4	137,800,000	8.1	0.7	23,200	118,849
China Tianrui Group Cement Co Ltd	717,600,000	1,514,500,000	0.5	98,800,000	7.3	0.6	8,090	187,206
Summit Ascent Holdings Ltd	795,600,000	1,300,000,000	611.5	(16,510,000)	NA	5.2	14,000	92,857
TCC International Holdings Limited	1,482,000,000	1,856,400,000	0.8	241,800,000	6.2	0.7	9,010	206,038
West China Cement Limited	510,900,000	687,700,000	0.7	60,710,000	8.5	0.6	5,170	133,017
SCG			**1.1**		**16.2**	**3.2**	**5,000**	**345,791**
Average of 10 Comparables			**0.76**		**7.2**	**1.4**	**22,450**	**151,262**
SCG's Rank versus Peers								**1**

Source: http://markets.ft.com/research/Markets/Tearsheets/Business-profile?s=743:HKG

SCG leads the ten Asian cement producers in terms of Return-on-Assets (both trailing twelve months and five-year average); Return-on-Investment (both trailing twelve months and five-year average); and, revenue growth (both year-over-year and five-year performance). SCG beat all of its competitors below in both of the aforementioned Return-on-Assets and Return-on-Investment metrics. (For brief descriptions of the comparable companies below, please see Exhibit A.)

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
SCG's Performance Relative to Ten Asian Cement Producers

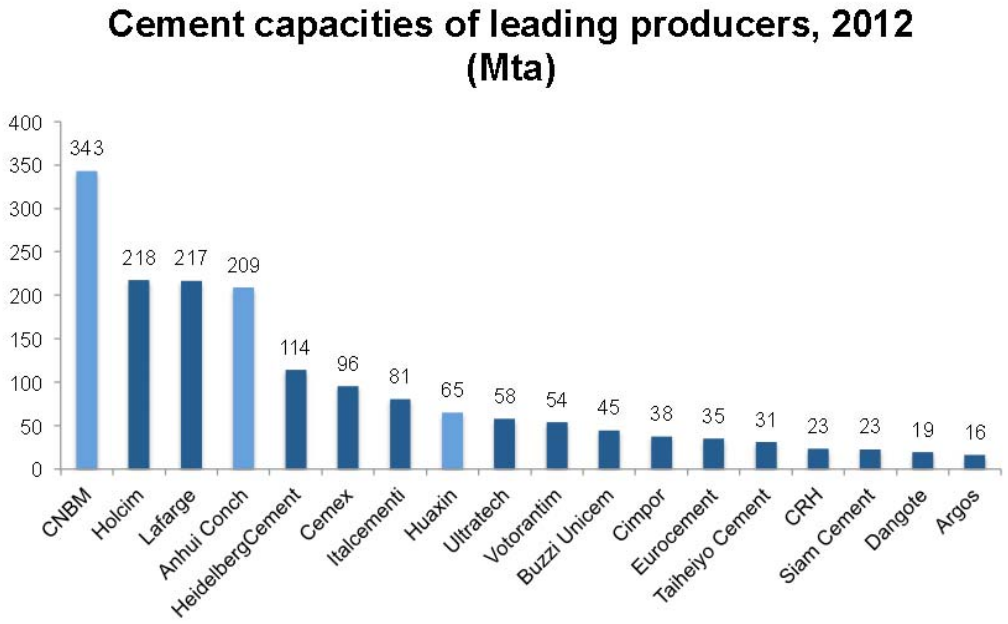
Company	Return on Average Assets (TTM)	Return on Average Assets (5 yr. average)	Return on Investment (TTM)	Return on Investment (5 yr. average)	Revenue (YoY) change %	Revenue (5 yr. growth rate)	Net Income (YoY) change %	Net Income (5 yr. growth rate)
Artgo Mining Hldg Co Ltd	NA	NA	NA	NA	NA	NA	NA	NA
Asia Cement (China) Holdings Corp	5.4%	6.4%	7.6%	6.4%	9.7%	17.7%	108.3%	14.9%
China National Building Material Co. Ltd	3.1%	11.5%	9.1%	11.5%	34.9%	34.9%	3.3%	30.7%
China Rare Earth Holdings Limited	-0.2%	-1.9%	-0.2%	-1.9%	-29.2%	1.8%	47.8%	NA
China Resources Cement Holdings Limited	7.8%	10.2%	10.9%	10.2%	15.8%	38.4%	43.6%	34.4%
China Shanshui Cement Group Limited	2.6%	9.4%	4.0%	9.4%	2.3%	17.1%	-33.0%	13.5%
China Tianrui Group Cement Co Ltd	2.4%	8.6%	4.5%	8.6%	14.1%	20.9%	-28.6%	19.3%
Summit Ascent Holdings Ltd	-19.2%	-8.7%	-19.8%	-8.7%	-19.6%	-54.8%	-1223.9%	NA
TCC International Holdings Limited	6.4%	5.3%	8.7%	5.3%	14.7%	35.7%	193.9%	NA
West China Cement Limited	3.5%	10.9%	4.5%	10.9%	18.3%	36.9%	3.7%	9.0%
SCG	**11.7%**	**11.7%**	**21.6%**	**22.7%**	**12.1%**	**52.4%**	**-7.4%**	**-9.5%**
Average of 10 Comparables	**1.3%**	**5.7%**	**3.3%**	**5.7%**	**6.8%**	**16.5%**	**-98.3%**	**20.3%**
SCG's Rank versus Peers	**1**	**1**	**1**	**1**	**6**	**1**	**7**	**7**

Source: http://markets.ft.com/research/Markets/Tearsheets/Business-profile?s=743:HKG

PROSPECTS FOR SCG'S CEMENT BUSINESS

SCG is in the midst of implementing its current 250 billion baht ($7.8 billion) five-year investment plan that was initiated in 2013. According to Kan Trakulhoon, SCG's president and chief executive officer, SCG's primary focus outside of Thailand is on companies in Vietnam and Indonesia. However, cement plants in Cambodia, Indonesia, Laos and Myanmar are already in the pipeline, and other building materials plants are planned to reduce shipping costs through increased local production.[6] While SCG is pursuing the furtherance of its cement business in much of Southeast Asia over the next several years, this analysis will be limited to the two markets—Thailand and Cambodia—in which the subject patent applications have been filed.

According to International Cement Review, Siam Cement
is the world's sixteenth largest cement producer by capacity.



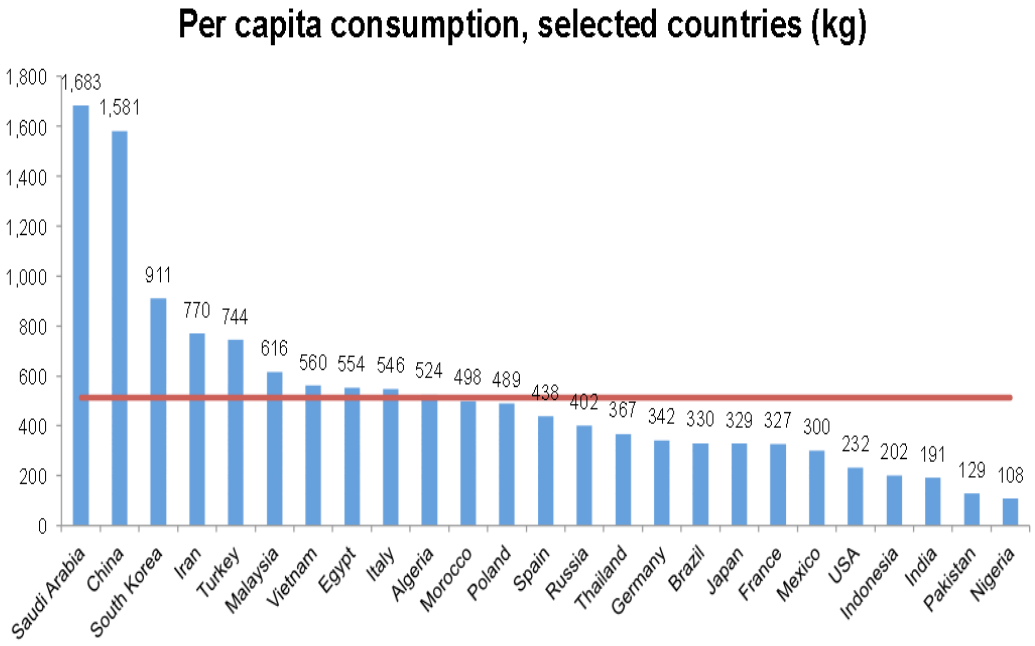
Source: International Cement Review

Prospects for Cement in Thailand

From a comparative point of view, long-term demand for cement in Thailand should rise. This is because the per capita consumption of cement in Thailand is 367 kg versus a peer average of roughly 500 kg per capita. This translates into a 9.5 million ton annual demand deficiency for cement in Thailand. Even when adjusting for the Gross Domestic Product (GDP) per capita of the countries listed below (exclusive of Saudi Arabia and South Korea, because of their low comparability to Thailand) that have higher levels of cement consumption per capita than Thailand, the demand deficiency for cement in Thailand is 6.9 tons annually.

[6] http://asia.nikkei.com/Business/Asean-Business-File/Siam-Cement-eyes-Indonesia-and-Vietnam-for-growth

The demand deficiency calculations could be understated as Thailand accounts for the highest cement exports in Southeast Asia and is a top three cement exporter in the world. Significant demand exists in the Indian subcontinent due to the low prices and high quality of Thai limestone in comparison to elsewhere in the region.[7]



Siam Research and Innovation - PCC Patent Valuation		
October 2, 2014		
Annual Demand Deficiency of Cement in Thailand		
Per Capita Cement Demand		
	Peer Group Average	500
	Thailand	367
	Difference (Peers vs. Thailand)	**133**
Population of Thailand		68,000,000
Demand Deficiency (kg)		9,044,000,000
Kilograms per Ton		0.0011
Annual Demand Deficiency (tons)		**9,948,400**

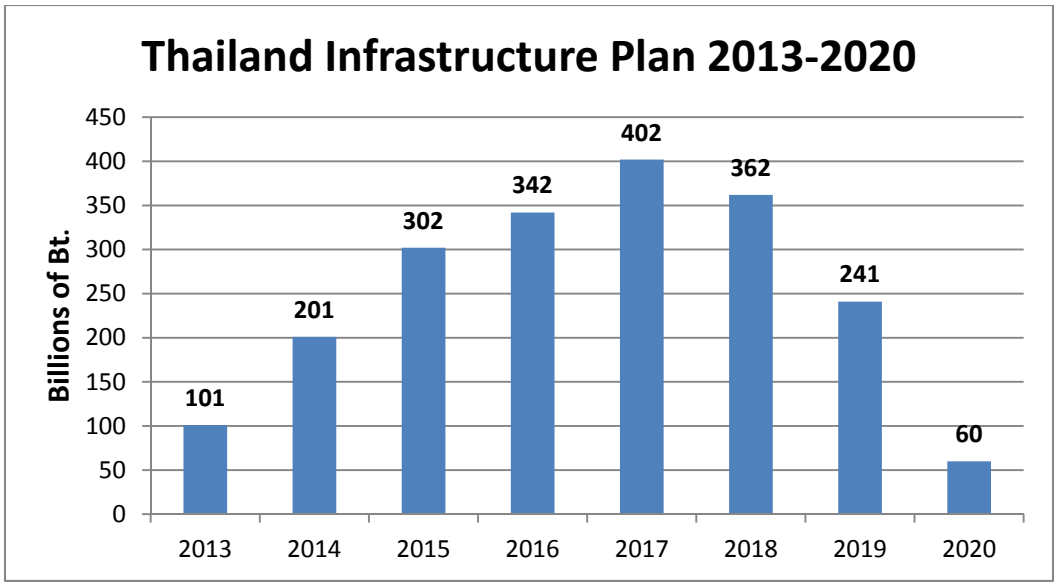
[7] http://www.worldcement.com/news/cement/articles/Cement_supply_and_demand_southeast_asia.aspx#.VAdP6mM7eVo

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Annual Demand Deficiency of Cement in Thailand, Adjusted for GDP per Capita

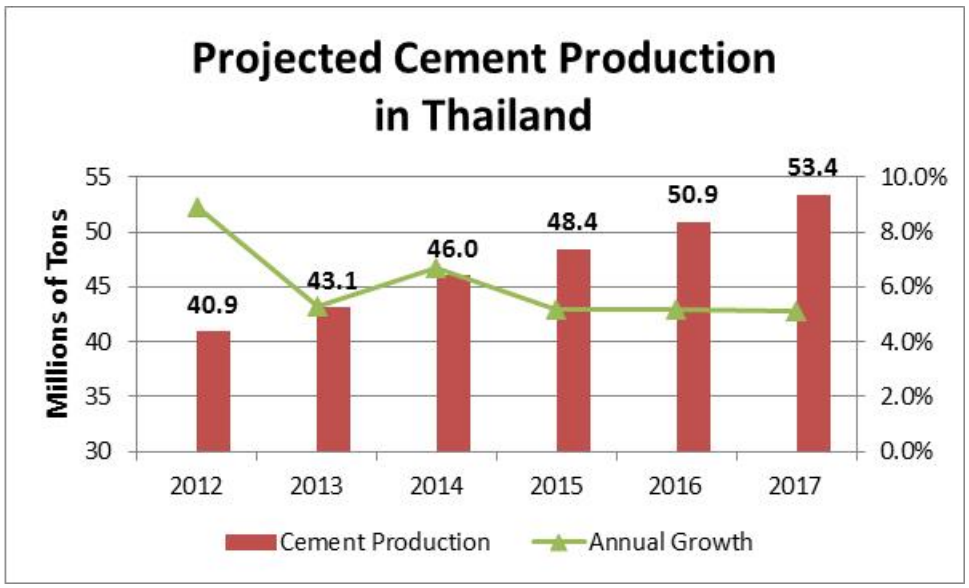
	Cement Consumption (Kg / Capita)	Gross Domestic Product per Capita[1]
China	1581	$9,844
Iran	770	$12,264
Turkey	744	$15,353
Malaysia	616	$17,748
Vietnam	560	$4,012
Egypt	554	$6,579
Italy	546	$30,289
Algeria	524	$7,534
Morocco	498	$5,456
Poland	489	$21,214
Spain	438	$29,851
Russia	401	$17,884
Average	**643**	**$14,836**
Thailand	367	$9,875
Average Above Thailand	276	$4,961
Average Above Thailand	75.3%	50.2%
Implied Additional Demand for Cement in Thailand (kg / capita)		92.1
Population of Thailand		68,000,000
Demand Deficiency (kg)		6,259,786,768
Kilograms per Ton		0.0011
Annual Demand Deficiency (tons)		**6,885,765**

[1] Source: International Monetary Fund (2013)

Thailand had an aggressive infrastructure plan in place for the years 2013 to 2020. (Please see the two charts directly below.) However, Business Monitor International reported that there have been delays to the Thai government's Bt. 2 trillion infrastructure plan which could limit the growth potential in the entire construction sector, a major end market for cement. As such, real growth for Thailand's construction sector has been revised down to 1.9% in 2014 (previously 3.5%), while the average real growth between 2014 and 2023 has been revised down to 2.4% per annum (previously 2.8%).

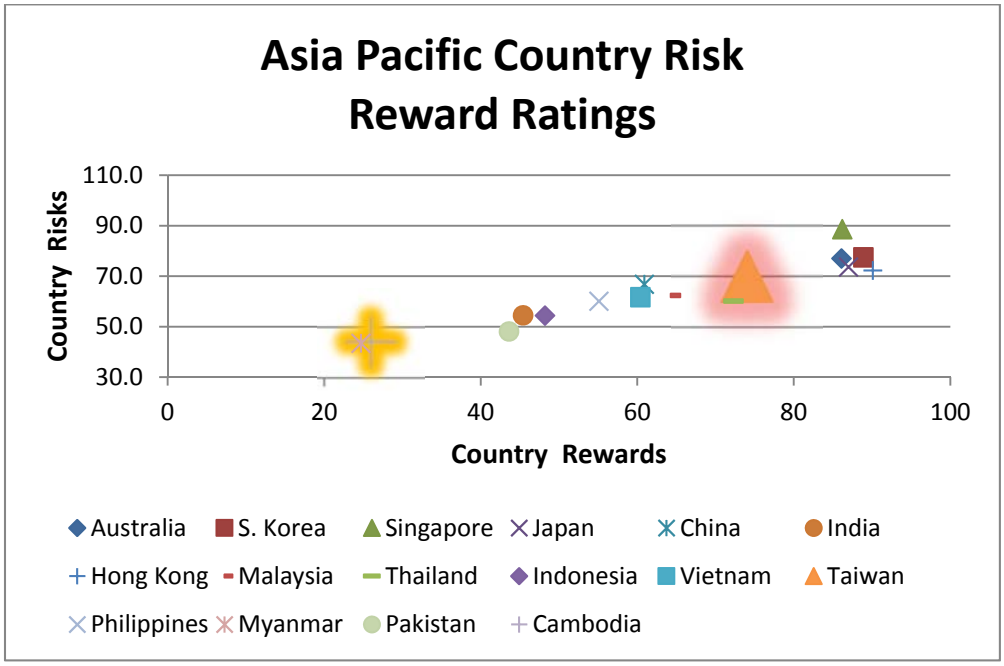


Overall cement production is expected to rise from 40.9 million tons in 2012 to 53.4 million tons in 2017. However, as a result of the delays in funding infrastructure projects in Thailand, the rate of growth in Thailand's cement production is expected to stabilize at slightly more than 5.0% per annum from 2015 to 2017, down from nearly 9% growth in 2012.

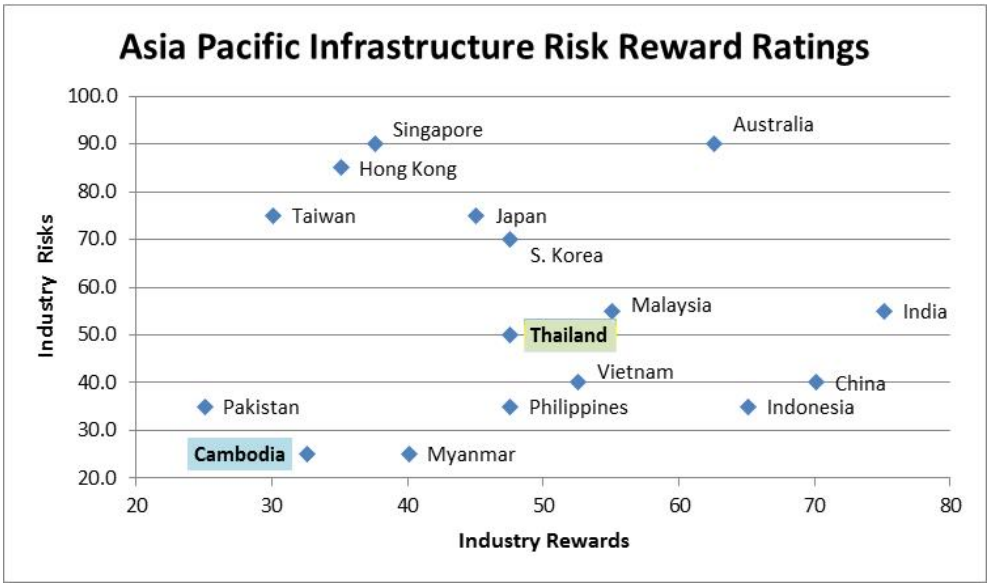


Nevertheless, the long-term prospects for conducting business in Thailand (in a general sense) and for infrastructure development (in particular) look promising. As can be observed on the chart below, no Asia Pacific countries offer more reward at less risk than Thailand. I think that the risks of conducting business in Thailand are exaggerated as per the charts below—originally created by Business Monitor International—because the political turmoil that came about earlier in 2014 is already largely behind us. Further, Thailand's government does seem to want to spur economic development. Another driver of

cement growth in Thailand may lie in building barriers to flooding as, according to the World Bank, the economic costs of Thailand's 2012 floods was $45 billion.[8]



In terms of infrastructure risks and rewards, Thailand's scores are roughly at the midpoint of its Asia Pacific neighbors. According to Business Monitor International, Vietnam, Indonesia, and China offer more reward at less risk than Thailand. Malaysia and India offer more reward in terms of pursuing infrastructure projects at only slightly more risk than Thailand.



[8] The Rise of the New East: Business Strategies for Success in a World of Increasing Complexity by Ben Simpfendorfer

In conclusion, in the second quarter of 2014, Thailand's total domestic cement demand registered volume growth that was flat year-over-year and down 9% sequentially. Looking ahead, Siam Cement could literally pave the road between Thailand and Cambodia. This is because the AEC Economic Corridor Flagship Initiative will strive to improve sub-regional economic cooperation between Cambodia and Thailand by, among other efforts, upgrading critical links in the Asian Highway from Bangkok to Phnom Penh. All weather road travel between the major cities of Bangkok and Phnom Penh is expected under this plan.

Prospects for Cement in Cambodia

According to the two charts above, Cambodia scores poorly in terms of both country and industry risk / reward profiles. One indication of the challenges that exist in the Cambodian cement industry is that Kampot Cement (a joint venture between the Khaou Chuly Group and Siam Cement Group) reduced its projected increased investment from $200 million (with a target of producing three million tons of cement annually) to a $100 million investment (targeting the production of two million tons of cement annually in 2012).[9]

Nevertheless, cement demand in Cambodia was reportedly 2.5 million tons in 2010 and was expected to grow at 10% over the following few years.[10] That may be a reasonable growth estimate as K Cement (Kampot) Ltd Chief Executive Prak Sereyvathna said that K Cement increased its production capability by 12% to 2,800 tons a day in 2012, compared to the same period in 2011.[11] Further, the International Monetary Fund predicted that Cambodia would be one of the fastest growing developing economies in the Asia Pacific region.

[9] http://www.phnompenhpost.com/business/kampot-cement-plan-expand-put-hold

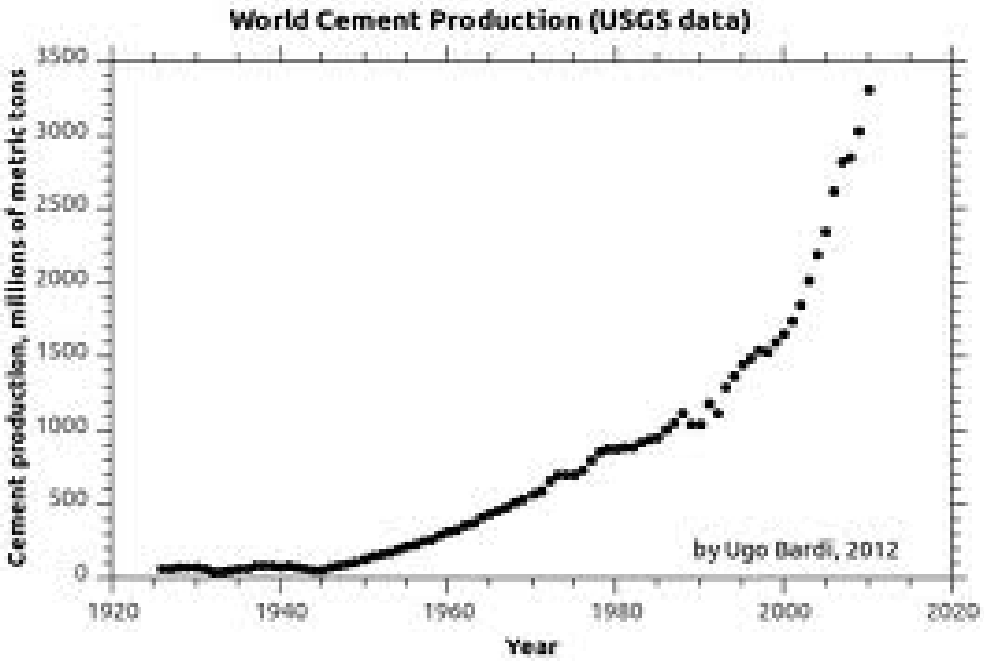
[10] http://www.worldcement.com/news/cement/articles/Cement_Southeast_Asia_Philippines_Myanmar_Laos_Cambodia_02131.aspx#.VCJSjxY7c7w

[11] http://www.phnompenhpost.com/real-estate/local-cement-production-increasing

THE CEMENT INDUSTRY

Cement is a fine powder which sets after a few hours when mixed with water, and then hardens in a few days into a solid, strong material. Cement is a hydraulic binder which means that it hardens when water is added. There are 27 types of common cement which can be grouped into five general categories and three strength classes: ordinary, high and very high. (Please see Exhibit B for a description of the major types of cement.)

Cement is mainly used to bind fine sand and coarse aggregates together in concrete. Concrete is a solid material made of cement, water, aggregates and often with admixtures. When fresh, it takes the form of the mold into which it is poured. When set and hardened, it is as strong as natural stone and resists time, water, frost, mechanical constraints and fire. No other material is as versatile when it comes to erecting buildings and infrastructure projects such as roads and bridges. Concrete is the second most consumed substance on earth after water. On average, each year, three tons of concrete are consumed by every person on the planet.



Global cement production is growing by 2.5% annually, and is expected to rise from 2.55 billion tons in 2006 to 4.4 billion tons by 2050.[12] Global consumption of cement rose from nearly 3.6 billion tons in 2011 to more than 3.7 billion tons in 2012.

[12] http://blogs.ei.columbia.edu/2012/05/09/emissions-from-the-cement-industry/

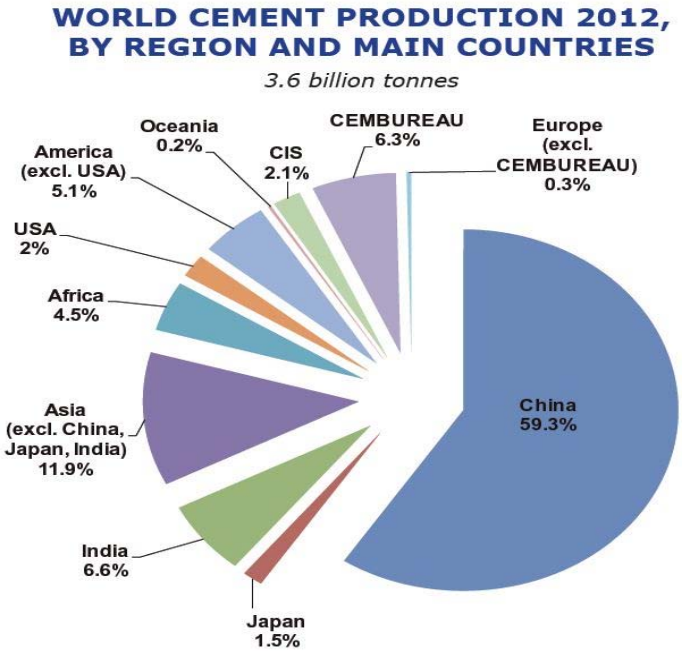
The chart below illustrates the projections for cement consumption throughout the world.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Cement Consumption Growth by Region (Year-over-Year %)

	2006	2007	2008	2009	2010	2011	2012	2013E	2014E	2015E
Western Europe	5	0	-9.8	-19.5	-6.3	-0.5	-14.2	-6.8	-1.1	1.7
Eastern Europe	15.7	7.6	0.2	-12.6	3	8.6	-4.4	2.9	1.5	3.5
Former Soviet Union	13.8	16.8	0.2	23.4	9.5	13.9	9.2	4.3	3.8	4.1
North America	-0.3	-7.9	-15.8	-26.3	0.9	2.5	8.8	3.8	6.4	6.2
Latin America	11.8	8.5	6.4	-2	5.9	7	3.9	2.1	3.7	3.5
MENA	7.6	11.8	10.2	7.8	6.6	1.6	4.1	1.4	3.9	5.1
Sub-Saharan Africa	11.8	15.7	1.9	5.3	3.3	11.4	9.6	7	6.8	7.1
China	14.9	13.1	3.3	18.3	14.4	10.8	6.6	7.1	3.5	2.1
India	12.2	8.9	5	10.6	7.2	6.2	6.7	3.6	5.2	6.8
North Asia	2.5	-0.8	-4.3	-8.9	2.5	2	1.8	3.3	0	0.6
South Asia	4.3	5.7	7.5	6	8.3	6.3	7.1	2.4	3.7	5.1
Australia/Pacific	-0.5	6.5	3.8	-8.5	1	4.9	-2.1	-0.8	3	-4.1
World (excl-China)	7.3	5.5	0.4	-4.7	4	5.1	3.1	2.1	3.5	4.6
EM (excl-China)	9.8	9.3	5.1	0.7	6.2	6.1	4.9	2.8	3.9	4.9

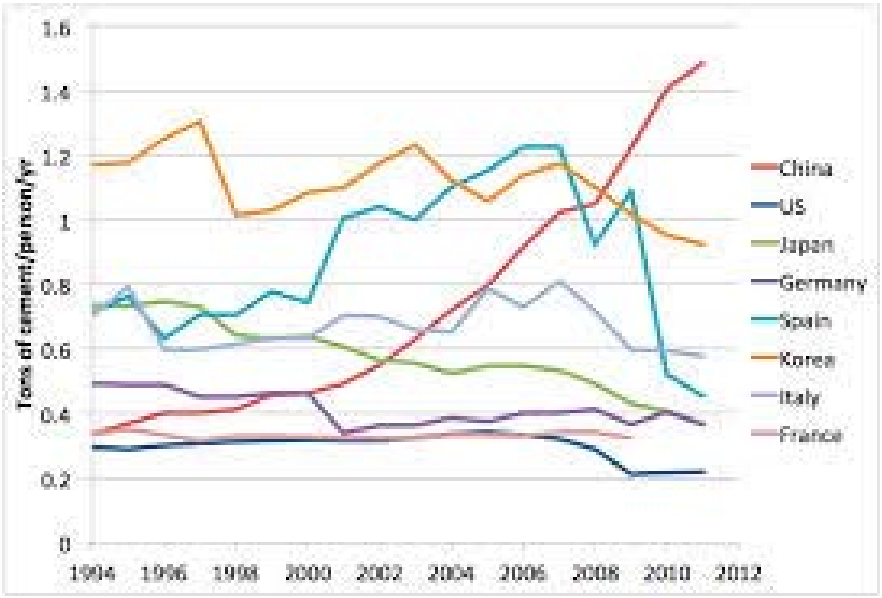
Sources: Industry and national sources, Global Cement Report, Morgan Stanley Research estimates (E)

China accounts for more than 50% of the world's cement production.

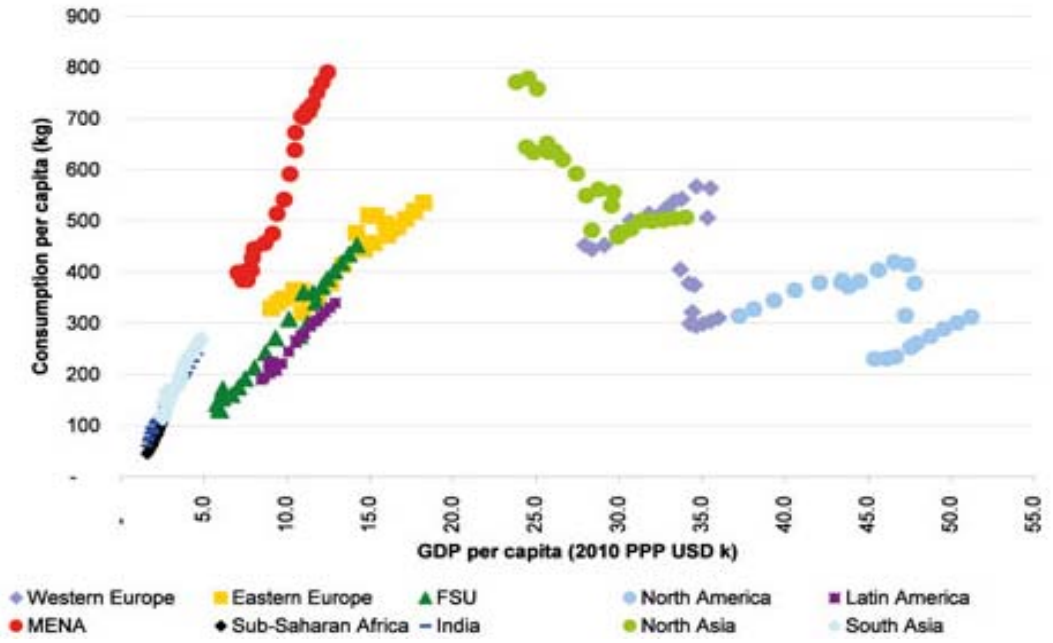


[1] IMF World Economic Outlook 2013, April 2013

As per the chart below, China's tons of cement produced per person has risen dramatically and consistently over the past twenty years.



The chart below illustrates the consumption of cement per capita as well as the GDP per capita in much of the world.



The chart below presents trends in cement pricing throughout the world.

Siam Research and Innovation - PCC Patent Valuation October 2, 2014 Cement Price Changes (ex-inflation, year-over-year (%))						
	2012	**2013E**	**2014E**	**2015E**	**2016E**	**2017E**
Western Europe	1	-1.3	-1	0.1	0.2	-
Eastern Europe	-1	-1.2	-0.2	-0.7	0.5	-
Former Soviet Union	8.2	-2.3	-1.1	-0.2	0.9	-
North America	0.9	3	1.5	2.2	1.7	0.9
Latin America	0.6	-2.7	-0.7	-0.3	0.1	-
MENA	-1.8	-0.4	-2.3	-0.7	0.4	0
Sub-Saharan Africa	-2	-3.9	-1.4	-1.5	-0.2	-
China	-18.5	-3.1	1.2	0.5	-0.5	-0.5
India	1.7	-11.1	0.1	2	2.4	-
North Asia	6.2	-0.7	-0.4	-0.2	-	-
South Asia	-2.3	-3	-1.2	-0.8	0	-0.1
Australia/Pacific	-1.3	-2.4	-1.5	-1.1	-0.5	-
World (ex-China)	**0.6**	**-2.9**	**-0.8**	**0**	**0.7**	**0**
Sources: Industry and national sources, company data, Morgan Stanley Research estimates (E)						

Structure of the Cement Industry

Cement production is a localized business and is characterized by stiff barriers to entry. Due to its low value-to-weight ratio, cement is very expensive to transport and therefore must be produced within a few hundred miles of where it will be deployed. The barriers to enter the cement industry are substantial and include the necessity to locate manufacturing plants near raw material sources (such as limestone quarries or coal mines) and long gestation periods in seeking government approvals. Also, cement production is highly energy and capital intensive, which means that the interest costs associated with financing cement production can be higher than in many other industries.

- Each ton of cement produced requires 60 to 130 kilograms of heavy fuel or its equivalent, depending on the cement variety and the process used, and about 105 KWh of electricity.

- The investment cost of a cement plant with a capacity of one million tons annually (the smallest plant worth building) is about $200 million, with correspondingly high costs for modifications. The pay-back of investment in a cement plant is about eight years, which ranks the cement industry among the most capital intensive industries.[13]

- However, the cement industry is becoming less labor intensive. With the development of modern automated production lines and continuous material handling systems, the cement industry has become a process industry using a limited amount of skilled laborers.[14]

[13,14] http://ac.els-cdn.com/S1877042813005776/1-s2.0-S1877042813005776-main.pdf?_tid=96aeda64-4140-11e4-bc9c-00000aab0f6c&acdnat=1411270819_237185faa38cac6d367c61cd0841243b

The structural barriers to competing in the cement industry mean that it is much cheaper for an incumbent to expand than for a new company to enter the cement business. Also, there is very little currency risk and very little threat from imported cement. However, a seaborne market provides a bit of competition. But only around 3% of global production is traded across borders. Countries with excess capacity and coastal cement works (built mainly to supply home markets by boat) can dump their spare output in nearby coastal states, capping prices there. Prices will tend to be higher, and profits fatter, in places far from big exporters such as China, Japan and Turkey, and in landlocked countries.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Key Mergers & Acquisitions in the Indian Cement Industry

Period	Target	Acquirer
September 1, 2013	Jaypee Cement (Gujarat)	Aditya Birla Group
August 1, 2013	Sree Jayajothi Cements	Cement Roadstone Holdings
May 1, 2013	Lafarge India Pvt.	Baring Private Equity Asia
March 1, 2013	Sree Jayajothi Cements	Blackstone Group L.P.
September 1, 2012	Adhunik Cement	Dalmia Cement (Bharat)
January 1, 2011	Binani Cement	Binani Industries
May 1, 2010	Avnija Properties	Kohlberg Kravis Roberts & Co. L.P.
November 1, 2009	Samruddhi Cement	UltraTech Cement
October 1, 2009	Samruddhi Cement	Grasim Industries
March 1, 2008	My Home Industries	CRH Plc
December 1, 2007	Shree Digvijay Cement Company	Cimpor Inversiones SA
August 1, 2007	Ambuja Cements	Holcim
August 1, 2007	ACE Refractories	Calderys
January 1, 2006	Uttar Pradesh State Cement Corporation	Jaiprakash Associates
January 1, 2006	Ambuja Cements	Holderind Investments
January 1, 2005	ACC	Ambuja Cement India Private
January 1, 2004	UltraTech Cement	Grasim Industries
April 1, 2001	Raymond Cement Division	Lafarge India Holding

http://www.smergers.com/industry-watch/indian-cement-industry/

The number of cement companies in operation across the globe is shrinking due to the industry's barriers to entry as well as to the wave of acquisitions occurring around the world. (The chart above provides a snapshot of acquisitions of Indian cement companies.) In Thailand, the cement industry is dominated by three producers (Siam Cement, Siam City Cement and TPI Polene) which collectively hold 85% of the market. In view of the relatively few cement companies in each country, the relatively high percentage of construction costs that cement represents and many purchasers of cement harboring the perception that cement is a commodity, cement companies have experienced an epidemic of accusations of price fixing and cartel behavior. "The first thing for any new competition regulator is to go out and find the cement cartel. My experience of this subject is, it is always there, somewhere," wrote Richard Whish, a Professor of Law at King's College in London. "The only countries in which I had been unable to find the cement cartel is where there is a national state-owned monopoly for cement."

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Sample of Anti-Cartel Actions Taken Against Cement Producers Around the World

Timeframe	Country	Affected Cement Producers	Stage of Investigation / Penalties
March 2014	Nigeria	Dangote Cement	The Nigerian government filed a counter-suit to Dangote's suit against the government.
March 2014	Australia	Five Major Cement Producers, Excluding Cement Australia Holdings	Awaiting Damages Verdict
February 2014	Azerbaijan	Not Disclosed	Allegations of Cartel Behavior
January 2014 to Present	Brazil		Total Potential Penalties are $1.3 billion but as of March 2014 a Hold Was in Place
		Votorantim Cimentos	$657 million
		Holcim	$214 million
		Itabira Agro Industrial	$173 million
		Cimpor Cimentos	$126 million
		InterCement (Camargo Correêa Group)	$102 million
		Itambe	$37.1 million
December 2013	Poland	Grupa Ozarow, Cemex Polska, Dyckerhoff Polska, Cementownia Warta and Cementownia Odra	10% of annual turnover which was €80 million
September 2013	Tanzania	Not Disclosed	Investigatory Stage
June 2013	India	11 Major Cement Producers Including ACC, UltraTech and Ambuja	$1.1 billion
April 2013	South Korea	Ssangyong Cement Industrial, Hanil Cement, Tongyang Cement, Sungshin Cement, Lafarge Halla, Asia Cement and Hyundai Cement.	The affected cement producers rescinded their announced price increases of 9%-10% for 2013 in view of regulatory scrutiny.
April 2013	Pakistan	Not Disclosed	Denied the existence of a cement cartel to Pakistan's Ministry of Industries.
2008 to Present	Europe	Eight Major Cement Producers Including Holcim, HeidelbergCement and Cemex Subsidiaries	Proceedings Continue, Possibly £4 billion

Scrutiny of Cement Quality

In addition to the scrutiny placed on cement companies in terms of alleged cartel behavior, greater scrutiny could be applied to the quality of cement used in construction. Oil rig owner Transocean singled out cement work as one likely fundamental cause of the April 2010 British Petroleum disaster in the Gulf of Mexico. The tricky process of sealing an offshore oil well with cement has failed dozens of times in the past, according to an Associated Press investigation. This Associated Press review of (U.S.) federal

accident and incident reports on offshore wells shows that the cementing process has been implicated at least 34 times since 1978.[15]

In 2013, Shenzhen's (China) Housing and Construction Bureau revoked the licenses of 31 construction companies for using substandard sea sand in concrete. The use of sea sand occurred because it is far cheaper than legal river sand. Untreated sea sand is unsuitable for construction because it still contains chlorine and salt, which corrodes steel while river sand from freshwater channels does not have that problem.[16] Similarly, concerns have been raised about low-quality cement playing a role in the collapsing of buildings in Nigeria.[17]

Carbon Dioxide Emissions

The traditional cement production process results in significant carbon dioxide emissions. Producing a ton of cement requires 4.7 million BTU of energy (equivalent to about 400 pounds of coal) and generates nearly a ton of CO^2.

Roughly 50% of direct emissions of CO^2 during cement production occur through a chemical process called calcination. Calcination occurs when limestone, which is made of calcium carbonate, is heated, breaking down into calcium oxide and CO^2. Reducing emissions from the calcination process requires the harnessing of a material other than limestone. Blended cement replaces some of the limestone-based clinker with other materials, primarily coal fly ash and blast furnace slag. Blended cement could reduce CO^2 emissions by as much as 20%, but widespread use of blended cement is limited by other environmental regulations (these substitutes can contain toxic heavy metals); the limited availability of substitute material; and some building code restrictions (blended cement can take longer to set).

Indirect emissions from burning fossil fuels to heat kilns can be reduced by switching to alternative fuels, including natural gas, biomass and waste-derived fuels such as tires, sewage sludge and municipal solid wastes. These less carbon-intensive fuels could reduce overall cement emissions by 18% to 24%, from 2006 levels, by 2050.

Alternatively, efficiency measures can reduce the demand for fuel by addressing the production process itself (such as switching from inefficient wet kilns to dry ones) or through technical and mechanical improvements (such as preventative maintenance to repair kiln leaks). While some estimate that energy efficiency improvements could achieve emission reductions of up to 40%, other research suggests that producers may have already exhausted this potential.

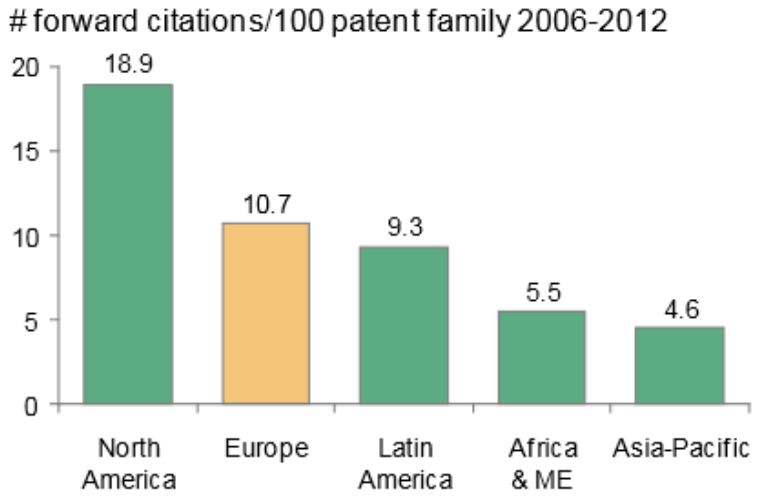
Finally, CO^2 emissions can be captured after they are produced through carbon capture and storage (CCS). In addition to traditional CCS methods, which are already employed in some power plants, concrete producers can actually use their own product as a sink for CO^2. Through the process of accelerated carbonation, CO^2 penetrates concrete and reacts with calcium hydroxide in the presence of water to form calcium carbonate; the result is stable, long-term CO^2 storage. As a mitigation technology, accelerated carbonation can be achieved by exposing freshly mixed concrete to flue gases with high CO^2 concentrations.

[15] http://www.huffingtonpost.com/2010/05/24/gulf-oil-spill-bad-cement_n_586952.html
[16] http://www.wired.com/2013/03/poor-quality-chinese-concrete-could-lead-to-skyscraper-collapses/
[17] http://sunnewsonline.com/new/?p=51116

INNOVATION IN THE CEMENT INDUSTRY

Many casual observers overlook the innovation that is taking place in the cement industry: The Economist magazine has written that little has changed over the 3,000 year life of the cement industry.[18] However, the reality is that there is a great deal of innovation occurring in the cement industry. In fact, when I searched worldwide patent databases, there were over 50,300 results with "cement" in the patent title or abstract.

Innovation in the Cement and Concrete Industries by Regions[19]



Source: Thomson Innovation, BCG analysis

Much of this innovation revolves around reducing the release of carbon dioxide. In addition to SCG's subject patent applications, the following initiatives are being taken to alleviate carbon dioxide release that is common in the production of cement:

- California-based Calera Corp. claims to have found a way for cement production to absorb more carbon dioxide than it emits, acting as a vehicle for carbon capture and sequestration (CCS). Similar to how certain corals produce reefs by excreting dissolved calcium carbonate, or limestone, Calera sends carbon dioxide emissions through seawater to create a chalky carbonate byproduct. This cement substance is then mixed with aggregate and water to create concrete. Its production avoids the need to heat the cement materials in coal-fired kilns, while sequestering carbon throughout

[18] http://www.economist.com/news/business/21579844-worlds-cement-giants-look-set-recoverybut-will-it-be-durable-ready-mixed-fortunes

[19] http://www.cembureau.be/sites/default/files/documents/The%20Cement%20Sector%20-%20A%20Strategic%20Contributor%20to%20Europe%27s%20Future.pdf

the process. Calera's primary investor is Vinod Khosla, founder of the highly successful venture capital firm Khosla Ventures.[20]

- California-based Carbon Sciences plans to mix cement with power-plant emissions and waste material from coal and steel production.

- Carbon Sense Solutions from Nova Scotia, Canada, redirects emissions from pre-cast concrete plants into new cement.

- United Kingdom-based Novacem developed a carbon negative cement which was based on magnesium silicate. The magnesium silicates used in the production of Novacem cement emit magnesium oxides when heated, and the process is carried out at around half the temperature required to manufacture Portland cement.[21] Novacem's technology was sold to Calix Limited of Australia in 2012.

Innovation in cement is not limited to minimizing carbon dioxide release. Intellectual Ventures, founded by Nathan Myhrvold, former Chief Technology Officer at Microsoft, has patented a self-healing cement. HeidelbergCement developed a special cement that purifies the air once it has been processed into concrete. Italcementi perfected TX Active, a photocatalytic white cement with self-cleaning properties that offers a long-lasting brilliant white color. Italcementi also developed i.light which is a transparent, light-transmitting cement that debuted at the Italian Pavilion for the Shanghai World Expo in 2012.[22]

[20] http://www.worldwatch.org/node/5996
[21] http://ec.europa.eu/environment/integration/research/newsalert/pdf/258na1_en.pdf
[22] http://blogs.hbr.org/2013/06/even-cement-can-be-special/

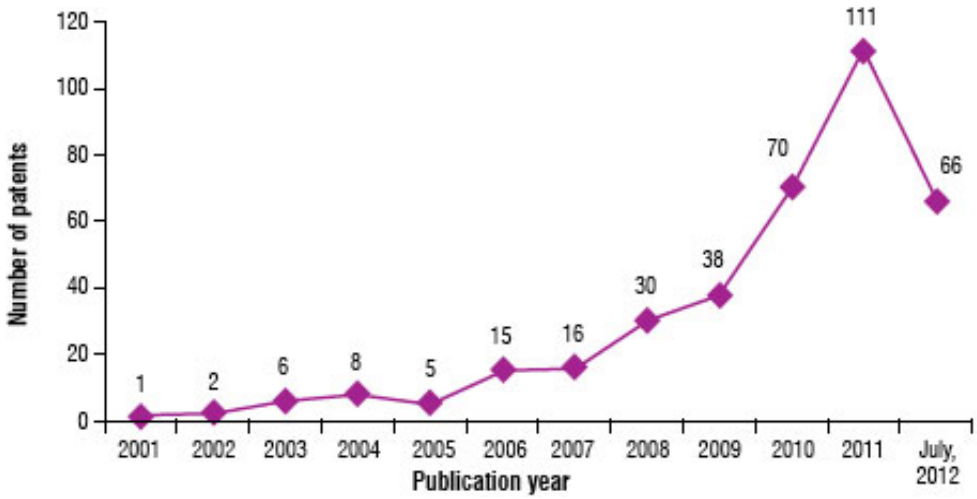
NANOTECHNOLOGY IN THE CEMENT INDUSTRY

Introduction of nanotechnology in the cement industry has the potential to address some of the challenges such as CO2 emissions, poor crack resistance, long curing time, low tensile strength, high water absorption, low ductility and many other mechanical performances. A remarkable improvement in the mechanical properties and durability of cementitious materials can be observed with incorporation of nanomaterials such as nano-SiO2, ZnO2, Al2O3, TiO2, carbon nanotubes, nano-clays, carbon nanofibers and other nanomaterials.[23]

Growth in Patents

The analysis of patenting activity pertaining to nanotechnology applications in cement industry resulted in 368 published patent applications from 2001 to July 2012. A sharp increase in annual publication of granted/published patents can be observed from 2007 onwards due to the commercial success in using nano-scale materials as cementitious ingredients. The tally of 154 granted patents from a total list of 368 patents clearly shows a high output of commercialization and research in this field.

Annual patent publication trends for nanotechnology applications in cement industry.

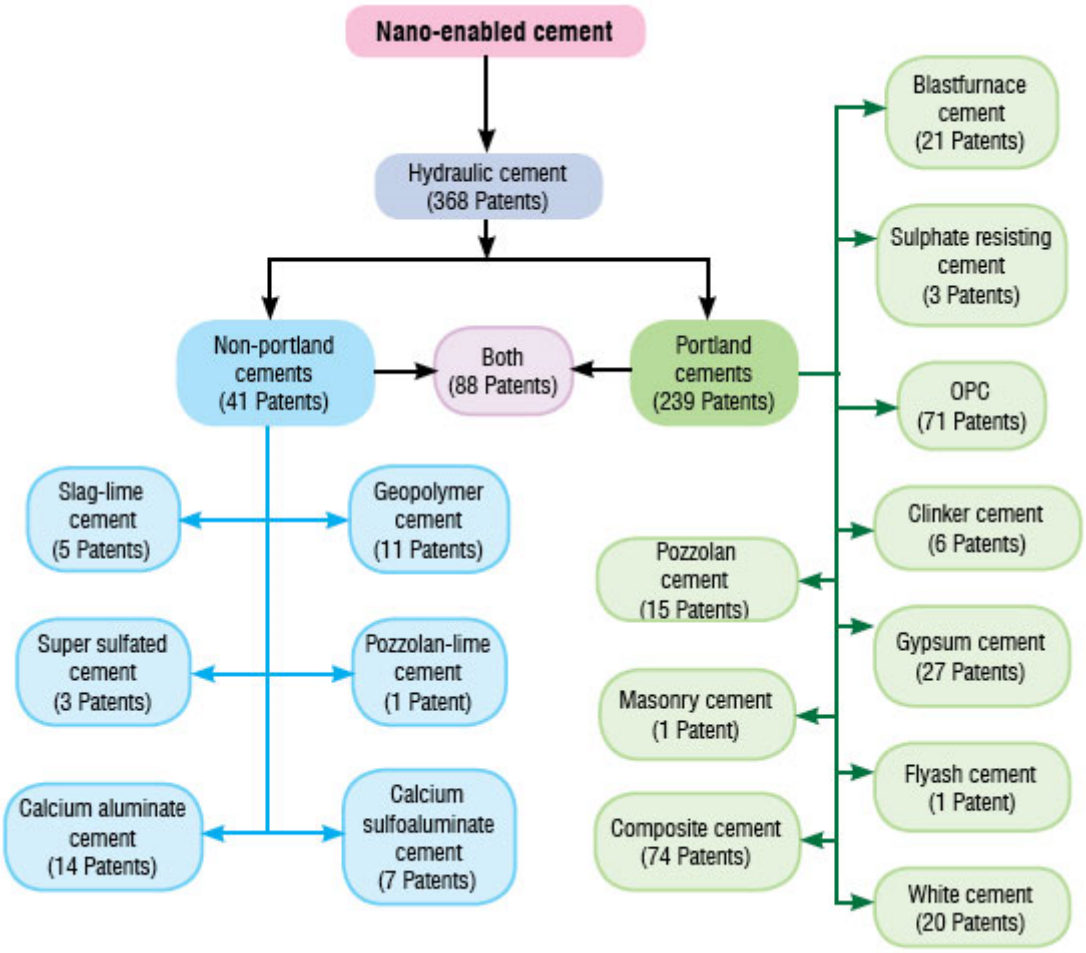


Nano-enabled Cement Patent Classification

The patent analysis below is restricted to nanotechnology applications in hydraulic cement (cement that will set and harden after being combined with water). Nanomaterials are widely used in Portland cement industry (prepared by heating clay and limestone in a kiln and pulverizing the mixture) when compared to non-Portland cements, which can be clearly observed from the number of patent filings in both classes. The majority of patents are filed in the area of composite cement (74 patents) and ordinary Portland cement (OPC) (71 patents) respectively, followed by gypsum-based cement with 27 patent filings.

[23] http://www.nanowerk.com/spotlight/spotid=28101.php#ixzz3CqJvqV5g

Classification of patents based on the type of nano-enabled cement.



Geographical Distribution

China is the world leader in terms of patent filings of nano-based cementitious materials: China's 154 patent applications contributed 41% of overall filings, representing the major and active R&D player in the area. South Korea is the second leading filer with 55 patents (15% of patent filings) on nano-enabled cement, closely followed by United States with 51 patents. Russia, Germany, Japan, France and India are the other leading patent filing countries with 37, 18, 11, 9 and 5 patents respectively, while the remaining patents represent a minor contribution from rest of the world.

Assignee Analysis

Dagestan State University (Russia) is the leading assignee with 15-patents to its credit, which are mainly focused on the development of heat resistant and high compression strength concrete materials. Halliburton Energy Services Inc (USA) comes second with 14-patents that are directed towards well bore cementing for the gas, oil or water wells using nano-cementitious materials. Other major assignees are either universities or companies from China. Among all the assignees, companies contribute 60% (221 patents) of the total patents filed on nanotechnology applications in the cement industry worldwide,

indicating a high rate of commercialization and R&D on a large scale, while universities/academic institutes own 24% (89 patents) of patents while the rest of the patents are filed by individual inventors.

Technology Analysis

Introduction of nanoscale materials into cementitious materials has emerged as a promising solution for enhancing the properties and performance of cement materials. A list of various nanomaterials that are added to cement as fillers along with their effect on properties are provided in the table below.

Various nanomaterials that are incorporated in cement and their effect on properties.

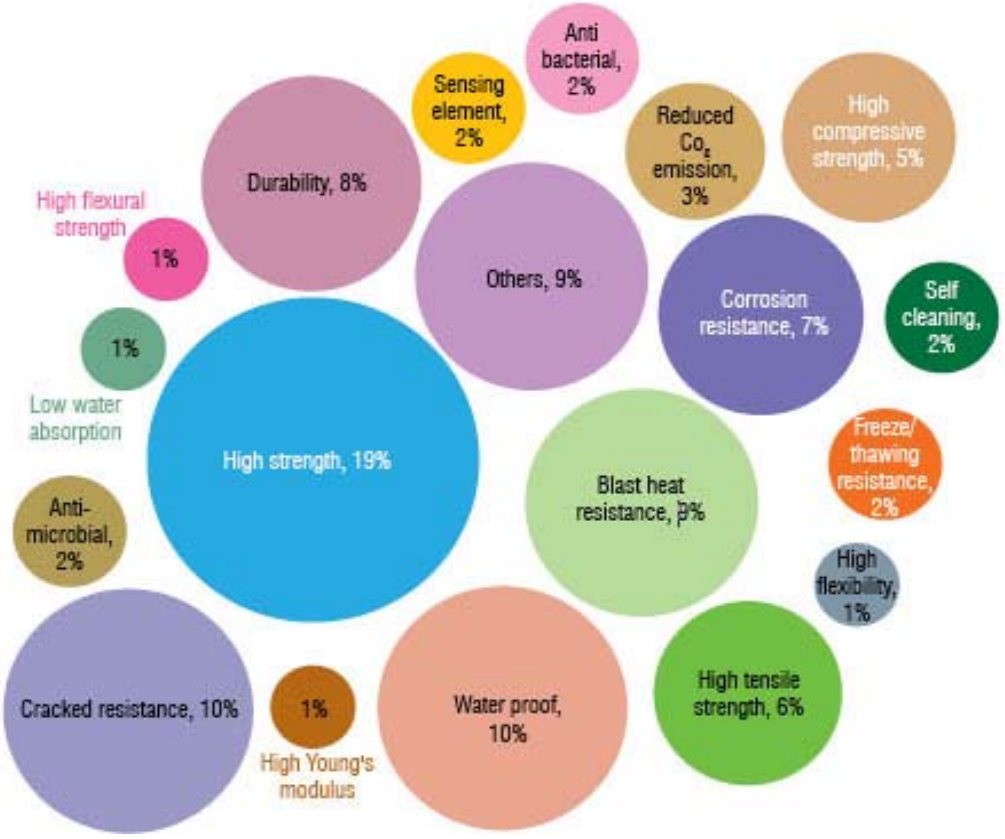
Nanomaterial	Effect on Property	Total Number of Patents
Nano-silica	Reduced CO_2-emissions, reduction in porosity/permeability, increased durability, crack resistance, high strength	125
Carbon nanotube	Improved compressive strength, tensile bending strength, flexural strength, durability, piezoelectric response, blast resistance, sensing ability	70
Polymer/clay nanocomposites	Increased tensile strength, reduced oxygen permeability, enhanced heat resistance	62
Nano-calcium carbonate	Improved hardness, compressive strength, shortening of C_3S hydration period	42
Nano-titania	Effective self-cleaning, degradation of NOx, corrosion resistance, flame resistance, abrasion resistance	38
Nano-alumina	Increased elastic modulus, compressive strength, thermal shock resistance, ability to withstand rapid temperature change	32
Nano-zinc oxide	Increased compressive strength, aging resistance	16
Nano-cellulose	Increased bonding strength, modulus of elasticity, reduced moisture absorption	5

The patents are segregated with respect to the characteristic property imparted by incorporated nanomaterials and is represented in the form of a bubble chart as shown in the figure below. The percentage of patents given in the chart is based on the size of the bubble (i.e. bigger size indicates greater number of patent filings corresponding to that specific attribute).

The analysis shows that nanomaterials are mainly incorporated to enhance various mechanical properties of cementitious materials. Introduction of carbon nanotubes (CNTs) in cement results in the improvement of various mechanical properties and also imparts sensing characteristics to the cement. However, the poor dispersion of CNTs is a major obstacle in achieving good mechanical performance in a composite. Effective methods for dispersion of CNTs such as ultrasonication and use of a surfactant are discussed in the prior art for the preparation of high strength concrete.

Nano-silica is increasingly being used as a replacement for micro-silica in cement industry. Because of its high reactivity and ultra-fine nature, it is commonly used in concrete mixes in large quantities, thereby reducing the cement content by 40% resulting in less CO^2 emissions and environmental contamination. Incorporation of nano-silica in cement slurry gives enhanced mechanical properties, lower porosity and permeability, which are crucial factors for increased durability.

Bubble chart showing the percentage-wise distribution of patents based on characteristic property imparted by the added nanomaterials.



Nano-titania is well known for its chemical stability and low toxicity. Moreover, it acts as an oxidizing agent at near UV-radiation. Concrete containing nano-titania showed effective self-cleaning property and it is used as a major component in polymer cement mortar for photo-catalytically degrading nitrogen oxide (NOx) and other pollutants.

Nano-alumina is widely used in cement mortar for increasing the elastic modulus of the cementitious material. The alundum-mullite pouring product has high compressive strength, good washing resistance, corrosion resistance and high thermal shock resistance, and can withstand rapid temperature changes.

Addition of calcium carbonate to cement-based aqueous composite provides improved hardness and abrasion resistance to concrete. The compressive strength of composition containing nano-calcium carbonate increased by at least 25% and showed 40% improvement in fluid loss, as compared to a cement composition without the nano-calcium carbonate.

Calcium carbonate is also used as a nano modifier for reducing C3S hydration induction period resulting in improved resistance to high temperature degradation of concrete. Polymer-clay nano-composites show an improvement in mechanical properties and barrier properties of nano-enabled cement.

Nano-silica, carbon nanotubes, nano-calcium carbonate, nano-titania, nano-alumina and polymer/clay nanocomposites are the most commonly used nanomaterials. These nanomaterials are mainly used to enhance various mechanical properties of the cementitious materials such as crack resistance, corrosion resistance, tensile strength and compressive strength.

Conclusions

The first patent on nano-enabled cement was published in 1996 and since then the patenting activity has continuously increased with an exponential rise after 2007. China has emerged as the major contributor in this area with 41% of global patents filings. It is also interesting to note that 60% of the patents are filed by corporates showing a clear trend of high rate of commercialization.

The emergence of nanotechnology in the cement industry has already shown a remarkable impact on mechanical properties of cementitious materials with patented commercial products such as Cor-Tuf®, HuberCrete®, Alpol, Nycon-G Nano already available in the market. These products have shown a significant improvement in tensile strength, corrosion resistance, crack resistance, heat resistance, high strength and many other mechanical properties of the cementitious materials. Moreover, nanotechnology can help to overcome major environmental challenges faced by the conventional cement materials, making them more environmental friendly with reduced CO^2 emissions and long durability.

Though the application of nanotechnology in cement industry is an emerging area, the trends in patent data indicate that commercial adaptation of this technology has already been started and in the near future nano-enabled cement is poised to occupy the cement industry in a big way.

SIAM RESEARCH AND INNOVATION

Siam Research and Innovation Co. Ltd. ("SRI") was founded in 1991 with a mission to develop world-class cement-based technology. Today, SRI has a staff of 89 researchers and technicians. Of the between 30 and 40 SRI researchers, eight hold PhDs. SRI's research staff is diversified in terms of the expertise of its employees: Some SRI employees are polymer scientists while others are materials scientists, while others have advanced degrees in nanotechnology.

SRI's team was endowed with a 2014 budget of Bt 320 million. These researchers and technicians have a wide array of modern equipment that meets ISO 17025 global standards at their disposal, including x-ray diffraction; scanning electron microscopes; particle size analyzers; ultraviolet spectrometry; mass spectrometry; and, inductively coupled plasma mass spectrometry. (SCG realizes a variety of tax advantages associated with its investments in research. For instance, SCG is eligible for a 200% deduction allowed on the compensation expended on researchers. Also, The Thai Board of Investment grants a holiday from corporate taxation on approved research equipment for a maximum of eight years and an exemption from import duties for such machines.)

SRI's research staff and equipment is leveraged through the research that takes place throughout SCG. In 2013, SCG invested over Bt. 2,068 million in research and development, representing an increase of 44.6% from the previous year. SCG's R&D and Product Design teams consist of 1,262 members, 73 of whom hold doctoral degrees. (Given that Bt. 3.7 billion of SCG-CBM's revenue comes from intersegment transactions, it stands to reason that innovations and research are also cross-pollinated throughout SCG.) SRI also leverages its research through its some 15 alliances with premier research institutions all over the world. (See the chart below.) At any given time, SRI typically has roughly five of its researchers circulating through the research facilities of its partners.

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Schedule of Collaborations

North America	Europe	Asia
University of California, Berkely	**University of Oxford**	Asian Institute of Technology
Georgia Tech	**Technische Universität München**	NSTDA
National Institutes of Standards and Technology	BASF	**Sirindhorn International Institute of Technology**
Penn State	**NANOCEM**	**Kasetsart University**
	Dini Engineering	King Mongkut's University of Technical Thonburi
		Chulalongkorn University

Bold represents active collaborations.

SRI's team has demonstrated that it delivers results. For instance, SRI has produced the innovations behind its 85 patents which are issued and pending. Thus, SRI's patent (including its patent application) count per SRI employee ratio is roughly 1:1. Further, SRI is dedicated to developing high value added (HVA) products and services. (SCG's rough definition of HVA sales are those that carry profit margins

between 10% and 20% higher than those of the competition.) SCG-CBM is targeting to generate 50% of its revenues from HVA sales, up from 37% currently.[24]

The fact that SRI is very judicious in choosing and managing its research initiatives is evidenced by the innovation that it produces as well as in the processes that it adheres to. In 2013, SRI won a company-wide award for its innovations that carried a prize of Bt. 1 million. Also, in 2012, SRI won an innovation award from the Thai Senate for its soy-improved cement. SCG Cement also has the distinction of being the only non-European company invited into Nanocem.[25]

Some of SRI's other innovations include anti-cracking / self-repairing cement (which is often required when applying plastering and is especially needed in Bangkok as the fact that that city is gradually sinking results in more cracking of pavements and building foundations[26]); softer cement (so that when people fall down they are less likely to get hurt); using carbon fiber to produce longer runs of cement; and, a self-cleaning cement. SRI is pursuing other promising innovations including a method of pre-cast technology to pour cement to build a house without human labor.

Most of SRI's research is practical rather than fundamental. Its selection of research initiatives is three-fold. First, SRI researchers are involved in reduction to practice which means that its researchers observe how cement is used in practice by going to the sites. The result is that practical inventions—relating to hand mixers and small trucks, for example—are developed. The second step consists of aligning research projects with customer surveys so that customer needs will be met. The third step in directing research initiatives is to review changes in demographics and societal developments so that SRI can produce cement that will meet the needs of the future. Finally, while SRI supports open innovation internally with SCG and with its partners around the world, SRI does not lose control of its research projects by placing such initiatives on platforms like Innocentive.

Analysis of Comparative Research Efficiency

The chart below provides a review of SCG's research efficiency compared to several of the world's largest cement producers.[27] I believe the most important ratio is "Patents per Research Budget" which is effectively the patent yield on investment in research. Based on this metric, SCG scores better (10.9 patents) than all of its much larger peers. The only peer close to SCG, in terms of patent yield on

[24] Similarly, company-wide sales of HVA have grown steadily to Bt. 149,924 million, accounting for 35% of revenue from sales, while sales of SCG eco value products amounted to Bt. 114,770 million, accounting for 26% of revenue from sales in 2013.

[25] Nanocem, founded in 2004, is a consortium of 24 academic and 11 industrial partners, all interested in fundamental research in the nanoscale science of cement and concrete.

[26] The Rise of the New East: Business Strategies for Success in a World of Increasing Complexity by Ben Simpfendorfer

[27] Admittedly, these comparisons are not perfect. For instance, I am not highly confident in all of the reported patent counts. On its website, Italcementi indicated that its patent count is 92. However, the patent counts for Holcim and HeidelbergCement were the result of my searches. As I am not aware of all of the trade names and companies that those companies acquired, I am not certain that all of the patent assignments have been properly recorded with the requisite patent offices. Thus, I am not confident that the numbers of patent counts for Holcim and HeidelbergCement are correct. Also, the research budgets do not line up perfectly with the patent counts. However, over time and by way of comparison, the data below should come into relative balance.

investment in research, is LaFarge, the peer that SRI's senior management indicated is performing the best cement research.

Other noteworthy points on the chart below include:

- SRI has by far the smallest research staff.
- SRI has the smallest research budget.
- Only Lafarge spends more of its revenues on research than SCG-CBM. (SCG-CBM's goal is to commit one percent of revenues to R&D.)
- Italcementi only has seven more patents than SRI (92 versus 85) despite Italcementi having more than four times the research staff—and nearly four times the research budget—of SRI. Further, Italcementi began its research initiative in 1992, just one year after the formation of SRI.
- SRI's patent portfolio may exceed that of HeidelbergCement (85 versus 23). On a relative basis, SRI's patent portfolio may be larger than it appears. Whereas almost all of SRI's patents are filed only in Thailand, the peers are much more internationalized businesses and therefore are more likely to have patent family members filed in far more countries. Lafarge reported on its website that its cumulative patent count is 1,316. However, it is not clear to what extent these are patent families versus multiple members of the same families and to what extent some of LaFarge's patents have lapsed.

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SCG's Research Efficiency Scores vs. World's Largest Cement Producers

	SCG	Italcementi	LaFarge	Holcim	HeidelbergCement	SCG's Rank
Number of Researchers	40	170	250		900	
Researchers per Research Budget	5.1	13.1	2.0	Not Available	15.8	3
Researchers per Revenues	0.029	0.040	0.016		0.06	2
Number of Patents (including applications)	85	92	1,316	391	23	
Research Budget (€ in millions)	€ 7.8	€ 13	€ 122	€ 61.3	€ 57.1	
Patents per Research Budget	**10.9**	**7.1**	**10.8**	**6.4**	**0.4**	1
Revenues (in millions)	€ 1,383	€ 4,235	€ 15,200	€ 16,321	€ 13,936	
Research / Revenue Ratio	0.6%	0.5%	0.8%	0.4%	0.4%	2
Year Founded	1913	1864	1833	1912	1873	

PERFORMANCE ANALYSIS: PORTLAND COMPARABLE CEMENT VS. ORDINARY PORTLAND CEMENT

Management of SRI is keenly aware of the comparative benefits of PCC versus OPC. An exhaustive review of the same is not necessary here.[28] The following commentary, in approximate order of importance, relates to the notes included in the chart below:

Note 1 - Carbon Dioxide Release

There are less carbon dioxide emissions associated with producing PCC compared to OPC. The standard release of carbon dioxide is 670 kg of CO^2 per ton. With PCC, it is 651 kg of CO^2 per ton, or 19 kg of CO^2 per ton less. SCG's patent pending PCC process currently requires a 12% increase in the use of limestone compared to OPC. (Siam Cement's goal is to drive the percentage increase in limestone to 20%.) The advantage of the greater use of limestone is that less clinker is used. Less clinker means that the temperatures of production can be reduced which reduces the release of carbon dioxide. There are no CO^2 emissions with limestone since limestone is not burned (which in the case of OPC, burning occurs at 1450° C) rather limestone is subject to a grinding process. Other advantages associated with low production temperatures include low abrasion and low cracking.

Note 2 - Clinker Intensity

The PCC process of producing cement uses seven percentage points less clinker than the OPC process (85% vs. 92%). The benefit of a less clinker intensive process is that less electricity is used and less carbon dioxide is emitted. Lower clinker intensity yields more kiln capacity in the sense that a given amount of clinker is associated with producing more tons of cement. Also, no additional time is required for the PCC process compared to the OPC process.

Note 3 - Limestone Intensity

The PCC process is, by design, a more limestone-intense method than OPC production. While there is some variability in the characteristics of limestone (depending on where in the world it is sourced) such variability can be addressed by modulating the additives used in the PCC production process.

Note 4 – Grinding Intensity

There are more grinding costs associated with PCC because a greater degree of refinement is necessary. This grinding of limestone reduces capacity in terms of tons per hour.

Note 5 – Thermal Energy Use

There is lower thermal energy use associated with PCC compared to OPC because less clinker is used in the former process.

[28] I was not provided with slides presented to me by the researchers which detail technical advantages of PCC.

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October 2, 2014

Performance of PCC vs. OPC

Note	Metric	Portland Composite Cement	Ordinary Portland Cement
1	Carbon Dioxide Release (kg. of CO^2 / ton of cement)	651	670
2	Clinker Intensity	85%	92%
3	Limestone Intensity	More Intensive	Less Intensive
4	Grinding Intensity	More Intensive	Less Intensive
5	Thermal Energy Use	10% Advantage	10% Disadvantage
6	Electric Energy Use	30% Advantage	30 Disadvantage
7	Chemical Intensity	Higher	Lower
8	Water Intensity	2.5% to 5.0% Advantage	2.5% to 5.0% Disadvantage
	Production Method	Neutral	
9	Pricing	Neutral	
10	Production Costs	Less Costly	More Costly
11	Financing / Interest Costs	10% to 15% Lower Costs	10% to 15% Higher Costs
12	Compressive Strength - 3 Days (kg. / sq. cm.)	289	246
	Compressive Strength - 7 Days (kg. / sq. cm.)	337	277
	Compressive Strength - 28 Days (kg. / sq. cm.)	377	324
	Compressive Strength - One Year	Neutral	
	Stiffening Period (Minutes)	271	325
13	Abrasion Resistance	0.156%	0.262%
14	Bleeding Value	3.10%	4.19%
15	Packing Density	Tighter Packing	Looser Packing
16	Hydration Time	Faster	Slower
	Cement to Concrete Ratio	3% Advantage	3% Disadvantage
	Stable Structure	Greater Stability	Less Stability
	Perforations in Cement	Unknown	
	Ability to Source	Neutral	
	Smoothness	Smoother	Less Smooth
	Cracking	Neutral	
	Sensitivity to Wind	Unknown	Unknown
	Sensitivity to Daily Changes in Temperature	Unknown	Unknown
	Sensivity to Placement Times	Unknown	Unknown
	Sensitivity to Time on Truck	Unknown	Unknown
	Fire resistance	Neutral	
	Weather	No Need to Test	
	Weight	Neutral	
	Location of limestone quarries	Neutral	
	Silica / gypsum concentrations	Neutral	
	Noise insulation	Neutral	
	Heat insulation	Neutral	
	Pourability	Neutral	

Note 6 – Electrical Energy Use

There is a 30% savings in the PCC production process as exhaust gas goes through boilers and is converted to steam electricity. However, the more intense grinding of limestone associated with PCC results in more intense use of electrical power.

Note 7 – Chemical Intensity

The PCC process is more chemical intense on a grams-per-ton basis than OPC. However, the use of such chemicals enables the use of limestone which is very inexpensive.

Note 8 – Water Intensity

OPC uses approximately 200 liters of water per cubic meter of concrete. The PCC process reduces its reliance on water by between 5 and 10 liters per cubic meter of concrete. Less water also contributes to greater compressive strength.

Note 9 – Pricing

Siam Cement's customers are satisfied that the quality of PCC is comparable to the quality of OPC. However, this does not translate into a pricing advantage for PCC over OPC. Generally there is excessive price pressure on mega projects. PCC may reduce such price pressure as large customers working on multi-national or infrastructure projects may be more sensitive to environmental issues.

Note 10 – Production Costs

Costs associated with producing PCC are about 3% less than the costs of producing OPC because less resources are consumed in producing PCC at 290 kg / cubic meter versus 300 kg / cubic meter for OPC. (This benefit does not dissipate due to changes in humidity or weather.) Also, it is less costly to produce PCC than OPC because more limestone is used, which costs approximately 10% as much as clinker. However, some of this gain is offset by higher costs associated with procuring the trade secreted additives and in grinding of the limestone. Finally, there are neither sourcing nor scalability issues associated with the PCC invention.

Note 11 – Financing Costs

Because PCC uses less clinkers, less kilns are required than is the case for OPC. Thus, PCC contributes to a 10% to 15% reduction in plant investment. Also, financing and interest costs should be lower for PCC production than for OPC production because of the higher throughput by the kilns during PCC production.

Note 12 - Compressive Strength

PCC is stronger than OPC for as much as one year following application. For instance, the compressive strength of PCC at 28 days is 377 kg. per sq. cm. while the compressive strength of OPC at 28 days is

324 kg. per sq. cm. After one year, there is no difference in the compressive strength of PCC versus OPC due to the end of the hydration process.

Note 13 - Abrasion Resistance

This is a measure of how well the cement performs when it is subject to vehicular traffic. Abrasion (or wear) resistance is measured by weight loss per area.

Note 14 - Bleeding

Bleeding is the extent to which water rises to the surface of cement. It is a well-known fact that cement can be made stronger by keeping the water-to-cement ratio low.[29] Also, low bleeding results in low abrasion. If there is more bleeding, there is less compressive strength and a greater likelihood of damage. There would be more cracking when the cement goes from wet to dry. Also, shrinkage rises when there is bleeding.

Note 15 – Packing Density

The greater concentration of limestone in the PCC process results in smaller particles which offer greater packing density than is the case of OPC.

Note 16 – Hydration Time

The presence of limestone in the PCC process results in faster reaction times (as far as mixing with water) which increases the cement's compressive strength and reduces construction costs. Similarly, faster drying results in a nicer look and a smoother cement surface.

[29] http://www.lmcc.com/concrete_news/0601/Increasing-concrete-abrasion-resistance.asp

PCC exceeds the Thai Industrial Standards Specifications. (Please see the chart below.) While PCC is qualified for use in Thai government projects for cement itself, there is no mandate to use PCC in Thailand.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
PCC Performance vs. Thai Industrial Standard Specifications

Criteria	TIS Requirements	PCC Typical Results	Direction of PCC Performance	Variance of Performance
Chemical Requirements				
Tricalcium Aluminate (C_3A) >8%	3.5	2.59	Positive	26.0%
Insoluble Residue	0.75	0.25	Positive	66.7%
Physical Requirements				
Powder (cm^2/g)	2,800	4,100	Positive	46.4%
Soundness				
Autoclave Expansion	0.80	-0.02	Positive	97.5%
Time of Setting				
Initial Set - Minimum Minutes	80	125	Positive	56.3%
Air Content of Mortar				
% Volume	12	9	Positive	25.0%
Compressive Strength				
Mortar Cubes @ 3 Days (kgf/cm2)	220	288	Positive	30.9%

VALUATION OF THE SUBJECT PATENT APPLICATIONS

In arriving at a conclusion of value for the subject patent applications, I employed the Cost Method, a variety of permutations of the Market Method, and the Income Method. These methods constitute the three pillars of valuation.

THE COST METHOD

The Cost Method of Valuation takes into account the costs and efforts that went into producing the subject asset. It was related to me by the management of SRI that Bt. 69 million was invested in PCC research. This amounts to nearly 10% of the cumulative budget of SRI from 2011 to 2012. Such investment in PCC seems excessive given that:

- No price premium is expected for PCC.
- SRI's management conveyed to me that SRI undertakes roughly 50 projects per year, some of which are pursued in conjunction with affiliates.
- SRI is pursuing many other research initiatives that appear to have a much higher inventiveness quotient than PCC.

As illustrated and discussed below, my application of the Cost Method reveals a valuation of the subject patent applications of Bt. 17.3 million. I am concluding that this is the appropriate value of the subject patent applications because:

- I wish to take a conservative stance with respect to this Patent Valuation Report.
- The Cost Method approximates the expenditures someone else would have to bear in trying to replicate or replace the subject asset. Given the amount of research into, and availability of, PCC, I do not think the design-around efforts would warrant an investment of Bt. 69 million.
- A large amount of the value of the subject patent applications—that related to the additive—is in the form of trade secrets. If only limestone were used in the production of PCC cement, the strength of cement would fall. But this is corrected by the trade secreted additive.

The following notes correspond to the application of the Cost Method illustrated in the chart below:

Note 1 – The source for these numbers was SRI's management.

Note 2 – SRI's management indicated to me that most of SRI's inventions are preserved as patents rather than preserved as trade secrets.

Note 3 – In SCG's 2013 Annual Report to Shareholders it was stated that the interest rate on liabilities held by SCG ranged between 2.0% and 5.0%. Thus, I took the mid-point of 3.5% as the factor by which nominal investments should be raised to arrive at the present value of invested amounts. The 3.5% number is also consistent with SCG's assumed returns on its pension investments of between 3.2% and 4.58%.

Note 4 – The source for these numbers was SRI's management.

Note 5 – Since it was conveyed to me that it takes an average of three years of research to generate a patent, I calculated the Research Value per Patent by taking 33% of each of the preceding three years of research expenditures and then dividing that cumulative sum by the number of patents in the subject (most recent) year.

Note 6 – No premium or discount to reflect the quality of the subject patent applications is needed because the five senior most SRI executives were unanimous in their belief that the subject patent applications scored a 50% in terms of its relative inventiveness.

Note 7 – The source for these numbers was SRI's management. Please see page 86 (Internal Valuation Analysis) for further discussion.

Notes 8, 9 – Please see Exhibits E and F. I am assuming that the professional fees in Cambodia will be similar to those in Thailand. While it is true that the maintenance fees have not yet been incurred, those funds are still reserved for maintenance fee payments and will not likely be used for other purposes. I am assuming that the application of a discount rate to bring these streams of maintenance fee payments to present value would be offset by increases in filing files over the next roughly 19 years of the lives of the patent applications (should they issue).

Siam Research and Innovation - PCC Patent Valuation

October 2, 2014

Cost Method of Valuation

Note	(Bt '000,000)	2007	2008	2009	2010	2011	2012	2013	YTD 2014
1	Expenditures at SRI	45	95	170	200	202	250	270	320
2	Apportionment to Patents	90%	90%	90%	90%	90%	90%	90%	90%
	Research Budget Directed to Patents (nominal)	40.5	85.5	153.0	180.0	181.8	225.0	243.0	288.0
3	Return Adjustment Factor	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%
	Research Budget Directed to Patents (real)					201.6	241.0	251.5	
4	Number of Patent Filings	10	17	13	3	9	15	14	2
5	Research Value per Patent			7.2	46.5	19.1	13.0	16.5	126.0
6	Premia / Discount							0%	
	Baseline Value of Patent							16,526,084	
7	Patent Specific Drafting / Prosecution Costs							150,000	
8	Commitment to Maintenance Fees			**Thailand**		**Cambodia**			
9	Official Fees			152,000		238,420			
9	Professional Fees			113,872		113,872			
	Total Fees			**265,872**		**352,292**		618,164	
	Value of the Subject Patent Applications							**17,294,248**	
	Value of the Subject Patent Applications (Rounded)							**17,300,000**	

THE MARKET METHOD

The Market Method holds that the value of a patent can be determined by reviewing comparable transactions. It is very rare to find recent data (and this data should consist of numerous data points) relative to comparable patent sales. Thus, the patent valuation analyst must find proxies for recent patent sales.

It should be noted that I searched all over the world for comparable patent valuations. For many of the comparable companies that I reviewed that had recent transactions, it was not clear how many cement-related patents the company owned. Part of the problem was that many of the comparable companies are located in developing countries where determining the number of patents an assignee has is very unreliable. For instance:

- The Sovereign Fund Investment Corporation of Dubai announced that it acquired a 1.4% stake in Dangote Cement, Nigeria's largest company by market capitalization, for $300 million on September 8, 2014. I was not able to determine how many patents Dangote owns and thus could not perform apportionment based on Dangote's recent valuation of $24.5 billion.[30]

- On May 7, 2014, The Jakarta Times reported that Semen Indonesia agreed to buy a 30% minority stake in a cement company based in Myanmar for roughly $30 million. However, the Myanmar cement producer that received this investment was not disclosed. Thus, I was not able to determine how many patents the unnamed company owns and could not perform apportionment.[31]

- On March 12, 2012, Adelaide Brighton Cement (from Australia) announced that it will buy a 30% stake in Malaysian white cement producer Aalborg Portland Malaysia Sdn. Bhd. for approximately $28.5 million. This transaction was complicated by an accompanying 10-year supply agreement and a potential $18.6 million expansion project. Further, I was not able to determine how many patents Aalborg Portland Malaysia Sdn. Bhd. owned and thus could not perform apportionment.[32]

Nevertheless, with respect to this Patent Valuation Report, the proxies I used to derive the value of the subject PCC patent application filed in Thailand were:

- The Implied Valuation Based on the Acquisition of Saraburi Cement Company
- The Implied Valuation Based on Eastern European Comparables
- The Implied Valuation Based on Investment in Cambodia Cement Chakrey Ting Factory

I weighted the calculated valuations that I derived from the analyses below equally because the comparability, reliability and relevance of information was roughly similar. It should be noted that all of the calculations performed under the Market Method were in a tight range. (Please see the chart immediately below.) The Market Method of Analysis indicates that the subject PCC patent application filed in Thailand deserves a valuation of Bt. 38.3 million.

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30 http://af.reuters.com/article/investingNews/idAFKBN0H30UM20140908

31 http://www.thejakartaglobe.com/business/semen-indonesia-enters-myanmar-market/

32 http://www.worldcement.com/news/cement/articles/Australia_Adelaid_Brighton_Cement_buy_stake_Aalborg_portland_Malaysia_770.aspx#.VAF2C2M7eVo

Siam Research and Innovation - PCC Patent Valuation October 2, 2014 Summary of Conclusions of Value				
Methodology	Calculated Value	Rounded Value	Instant Weighting	Methodology Weighting
Market Method	**฿38,265,375**	**฿38,300,000**		2
The Saraburi Acquisition Comparable	฿41,441,507	฿41,400,000	1	
Eastern European Comparables	฿38,477,311	฿38,500,000	1	
Cambodia Cement Chakrey Ting Factory Comparable	฿34,877,307	฿34,900,000	1	

The Saraburi Cement Company Comparable

Cemex acquired Saraburi Cement Company in May 2001. While this is admittedly a dated transaction, it did occur in the Thai market (probably not too far from SRI's research facilities). Below is my derived valuation of the subject patent application in Thailand using the aforementioned acquisition as a reference point.

Siam Research and Innovation - PCC Patent Valuation October 2, 2014 Implied Valuation of PCC Patent Application (Thailand) Based on Acquisition of Saraburi Cement Company		
Note		
1	Market Capitalization of SCG (Bt.)	540,000,000,000
2	Cement Revenues / SCG Revenues	13.3%
3	Profitability Adjustment to Cement Business	50%
	Valuation of the Cement Business (Bt.)	107,499,856,074
4	SCG's Cement Capacity in Thailand (tons)	23,000,000
	Valuation per Ton of Cement (Bt.)	4,674
	Currency (Bt. to $)	0.031
	Valuation per Ton of Cement ($)	$144.9
	Currency (Bt. to €)	0.024
	Valuation per Ton of Cement (€)	€ 112.2

Note 1 – The source was The Stock Exchange of Thailand, end of September 2014.

Note 2 – Please see related analysis on page 10.

Note	Siam Research and Innovation - PCC Patent Valuation October 2, 2014 Implied Valuation of PCC Patent Application (Thailand) Based on Acquisition of Saraburi Cement Company	
	Cemex's Acquisition of Saraburi Cement Company (SCC)	
5	Consideration Paid at Acquisition	$73,000,000
5	Percentage of SCC Acquired	99%
	Implied Value of 100% of SCC, Historic Value	$73,737,374
	Implied Value of 100% of SCC, Present Value	$116,975,755
5	Date of Acquisition	5/1/2001
	Today's Date	9/30/2014
	Years Since Acquisition	13.4
5	Announced Annual Synergies	$3,000,000
6	Years of Synergies	3
7	Inflation Rate in Thailand	3.50%
	Present Value of Synergies at Acquisition, Historic Value	$8,404,911
	Present Value of Synergies at Acquisition, Present Value	$13,333,412
	Implied Value of SCC Acquisition Without Synergies, PV	$103,642,343
5	SCC Cement Production Capacity (Tons per Year) at Acquisition	700,000
8	Anticipated Annual Growth Rate of Capacity (Net of Inflation)	1.5%
	Anticipated Capacity at Acquisition in 2014	854,738
	Valuation per Ton of Cement - SCC	$121.3
	Differential in Valuation per Ton of Cement	$23.63
	Siam Cement vs. Saraburi Cement Company	
	Tons of Capacity (Siam Cement in Thailand)	23,000,000
	Additional Value of Siam Cement Capacity	$543,600,012
9	Apportionment to Patents	20%
10	Number of Siam Cement's Patents / Patent Applications	85
11	Premium / Discount Applied to PCC Patent Application	0%
	Implied Valuation of PCC Patent Application - Thailand	$1,279,059
	Currency Conversion ($ to Bt.)	32.4
	Implied Valuation of PCC Patent Application - Thailand	฿41,441,507
	Implied Valuation of PCC Patent Application - Thailand	**฿41,400,000**
	Rounded	

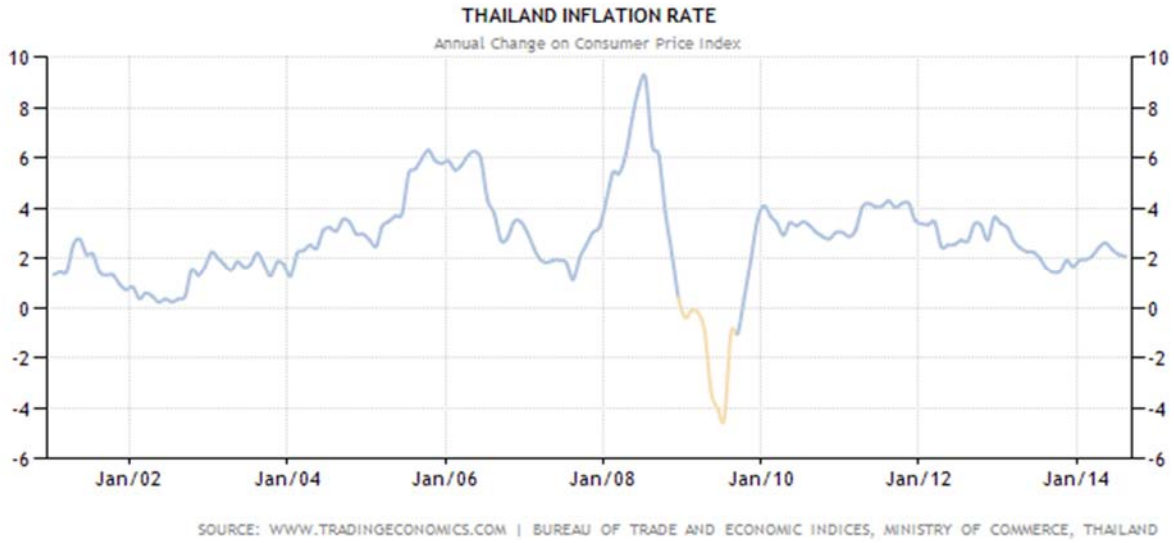
Note 3 – Based on public disclosures, it is not possible to determine the exact profitability of SCG's cement business. However, for 2013, Siam Cement's profit margin was 9.2%, which was much higher than SCG Paper's profit margin of 6.1% and SCG Chemical's profit margin of 5.4%. For the first half of 2014, Siam Cement's profit margin was 8.4%, which was much higher than SCG Paper's profit margin of 7.7% and twice as robust as SCG Chemical's profit margin of 4.2%. Given than SCG's Paper and Chemicals' revenues are much larger than Siam Cement's revenues, a 50% profitability adjustment is very reasonable.

Note 4 – The source was management of SRI.

Note 5 – On May 11, 2001, CEMEX announced its acquisition of 99% of Saraburi Cement Company for an enterprise value of approximately $73 million. Located north of Bangkok, Saraburi's plant operated at full capacity, producing 700,000 metric tons per year. After the acquisition, CEMEX's PMI team completed Saraburi's integration in four months, identifying potential annual savings of about $3 million.[33],[34]

Note 6 – IncreMental Advantage estimates.

Note 7 – According to Thailand's Ministry of Commerce (Bureau of Trade and Economic Indices), the inflation rate in Thailand averaged 4.56% from 1977 until 2014.[35] I drew a chart of the inflation rate in Thailand from 2001 to 2014. While I was not able to obtain the data points, a review of the chart below suggests that the inflation rate in Thailand from 2001 to 2014 averaged 3.5%.



Note 8 – I estimate that Cemex projected that Saraburi Cement Company would increase its capacity by 5% per annum when the former company acquired the latter company. That growth rate of capacity minus the 3.5% inflation rate equals 1.5%.

[33] http://www.cemex.com/ar2001/04r_operaciones/resglob_oper2_eng.htm
[34] Later in 2001, Cemex attempted to take over one of the top three cement producers in Thailand, the debt-ridden TPI Polene PCL, but Cemex and the creditors of the ailing Thai firm were unable to reach an agreement.
[35] http://www.tradingeconomics.com/thailand/inflation-cpi

Note 9 – I am assuming that the difference in valuation per ton of cement—Siam Cement's valuation per ton of cement today versus the valuation of Saraburi Cement Company's cement when it was acquired--is due to intangible assets owned by Siam Cement. In arriving at an apportionment of this differential in value, I began by considering the well-established and oft-cited 25% Rule.[36] The 25% Rule holds that the patent-holder is entitled to 25% of the earnings that a commercializer derives from selling products that incorporate the patented feature. This is tantamount to stating that 25% of the success of a product is due to its corresponding patents. However, I am reducing the apportionment to Siam Cement's patents from 25% to 20% to reflect the fact that Siam Cement has a great deal of value inherent in its trademarks, brand equity, salesforce, customer relationships, trade secrets and approvals from the Thailand Industry Standards authorities.

Note 10 – The source was management of SRI.

Note 11 – No premium or discount to reflect the quality of the subject patent applications is needed because the five senior most SRI executives were unanimous in their belief that the subject patent application scored 50% in terms of its relative inventiveness.

[36] The 25% Rule is based on royalty rate analysis conducted in the 1950s and championed by the late Robert Goldscheider. Richard Razgaitis has called it the "most famous heuristic, or rule of thumb, for licensing valuation." Despite the Uniloc v. Microsoft[36] decision, the 25% Rule is still a legitimate starting point for apportionment.

The Eastern European Cement Producers Comparable

A very scholarly report was published in December of 2013 entitled, "Economic Analysis of the European Cement Industry."[37] This report was authored by Marcel Boyer, Emeritus, Professor of Economics, Université de Montréal, Canada and Jean-Pierre Ponssard, Emeritus Director of Research at CNRS, Department of Economics, École Polytechnique, France. One of the conclusions from this report was that the 2011 valuation of cement capacity was €165 per ton for all of Europe; €183 per ton for Western Europe; and, €95 per ton for Eastern Europe. Below is my derived valuation of the subject patent application in Thailand using the valuation of cement capacity in Eastern Europe (because the economy in Eastern Europe more closely resembles the economy in Thailand) as a reference point.

Note	Siam Research and Innovation - PCC Patent Valuation October 2, 2014 Implied Valuation of PCC Patent Application (Thailand) Based on Eastern European Comparables	
1	Market Capitalization of SCG (Bt.)	540,000,000,000
2	Cement Revenues / SCG Revenues	13.3%
3	Profitability Adjustment to Cement Business	50%
	Valuation of the Cement Business (Bt.)	107,499,856,074
4	SCG's Cement Capacity in Thailand (tons)	23,000,000
	Valuation per Ton of Cement (Bt.)	4,674
	Currency (Bt. to $)	0.031
	Valuation per Ton of Cement ($)	$144.9
	Currency (Bt. to €)	0.024
	Valuation per Ton of Cement (€)	€ 112.2
	Valuation per Ton of Cement - Siam Cement	€ 112.2
5	Valuation per Ton of Cement - Eastern Europe	€ 95.0
	Differential in Valuation per Ton of Cement	€ 17.2
	Siam Cement vs. Eastern European Comparables	
4	Tons of Capacity (Siam Cement in Thailand)	23,000,000
	Additional Value of Siam Cement Capacity	€ 394,996,546
6	Apportionment to Patents	20%
7	Number of Siam Cement's Patents / Patent Applications	85
8	Premium / Discount Applied to PCC Patent Application	0%
	Implied Valuation of PCC Patent Application - Thailand	€ 929,404
	Currency Conversion ($ to Bt.)	41.4
	Implied Valuation of PCC Patent Application - Thailand	฿38,477,311
	Implied Valuation of PCC Patent Application - Thailand	**฿38,500,000**

[37] http://hal-polytechnique.archives-ouvertes.fr/docs/00/91/56/46/PDF/Boyer_Ponssard_131209.pdf

The notes below correspond to those in the chart above.

Note 1 – The source was The Stock Exchange of Thailand, end of September 2014.

Note 2 – Please see related analysis on page 10.

Note 3 – Based on public disclosures, it is not possible to determine the exact profitability of SCG's cement business. However, for 2013, Siam Cement's profit margin was 9.2% which was much higher than SCG Paper's profit margin of 6.1% and SCG Chemical's profit margin of 5.4%. For the first half of 2014, Siam Cement's profit margin was 8.4% which was much higher than SCG Paper's profit margin of 7.7% and twice as robust as SCG Chemical's profit margin of 4.2%. Given than SCG's Paper and Chemicals' revenues are much larger than Siam Cement's revenues, a 50% profitability adjustment is very reasonable.

Note 4 – The source was management of SRI.

Note 5 – Please see footnote 37.

Note 6 – I am assuming that the difference in valuation per ton of cement—Siam Cement's valuation per ton of cement today versus the valuation of cement capacity in Eastern Europe--is due to intangible assets owned by Siam Cement. In arriving at an apportionment of this differential in value, I began by considering the well-established and oft-cited 25% Rule.[38] The 25% Rule holds that the patent-holder is entitled to 25% of the earnings that a commercializer derives from selling products that incorporate the patented feature. This is tantamount to stating that 25% of the success of a product is due to its corresponding patents. However, I am reducing the apportionment to Siam Cement's patents from 25% to 20% to reflect the fact that Siam Cement has a great deal of value inherent in its trademarks, brand equity, salesforce, customer relationships, trade secrets and approvals from the Thailand Industry Standards authorities.

Note 7 – The source was management of SRI.

Note 8 – No premium or discount to reflect the quality of the subject patent applications is needed because the five senior most SRI executives were unanimous in their belief that the subject patent application scored 50% in terms of its relative inventiveness.

[38] The 25% Rule is based on royalty rate analysis conducted in the 1950s and championed by the late Robert Goldscheider. Richard Razgaitis has called it the "most famous heuristic, or rule of thumb, for licensing valuation." Despite the Uniloc v. Microsoft[38] decision, the 25% Rule is still a legitimate starting point for apportionment.

The Cambodia Cement Chakrey Ting Factory Comparable

On June 17, 2014, Huaxin Cement injected $24 million into Cambodia Cement Chakrey Ting Factory to acquire a 40% stake in the southeast Asia-based company. With daily production capacity 3,200 tons, Cambodia Cement Chakrey is the biggest cement-manufacturing company in Cambodia.[39] Below is my derived valuation of the subject patent application in Thailand using the valuation of Cambodia Cement Chakrey's cement production capacity as a reference point.

The notes below correspond to those in the chart above.

Note 1 – The source was The Stock Exchange of Thailand, end of September 2014.

Note 2 – Please see related analysis on page 10.

Note 3 – Based on public disclosures, it is not possible to determine the exact profitability of SCG's cement business. However, for 2013, Siam Cement's profit margin was 9.2% which was much higher than SCG Paper's profit margin of 6.1% and SCG Chemical's profit margin of 5.4%. For the first half of 2014, Siam Cement's profit margin was 8.4% which was much higher than SCG Paper's profit margin of 7.7% and twice as robust as SCG Chemical's profit margin of 4.2%. Given than SCG's Paper and Chemicals' revenues are much larger than Siam Cement's revenues, a 50% profitability adjustment is very reasonable.

Note 4 – The source was management of SRI.

Note 5 – The source is footnote number 39.

Note 6 – IncreMental Advantage estimate. The thinking is that minority shareholders receive discounts on their equity stakes because they lack control in terms of voting rights and decision-making authority.

Note 7 – IncreMental Advantage estimates.

Note 8 – Huaxin Cement must have been aware of the difficulties of transacting business in Cambodia and would thus have negotiated a large discount on its investment.

Note 9 – I am assuming that the difference in valuation per ton of cement—Siam Cement's valuation per ton of cement today versus the valuation of Cambodia Cement Chakrey's cement capacity—is due to intangible assets owned by Siam Cement. In arriving at an apportionment of this differential in value, I began by considering the well-established and oft-cited 25% Rule.[40] The 25% Rule holds that the patent-holder is entitled to 25% of the earnings that a commercializer derives from selling products that incorporate the patented feature. This is tantamount to stating that 25% of the success of a product is due to its corresponding patents. However, I am reducing the apportionment to Siam Cement's patents from 25% to 20% to reflect the fact that Siam Cement has a great deal of value inherent in its trademarks, brand equity, salesforce, customer relationships, trade secrets and approvals from the Thailand Industry

[39] http://www.globalcement.com/news/item/2609-huaxin-cement-invests-in-cambodia-cement

[40] The 25% Rule is based on royalty rate analysis conducted in the 1950s and championed by the late Robert Goldscheider. Richard Razgaitis has called it the "most famous heuristic, or rule of thumb, for licensing valuation." Despite the Uniloc v. Microsoft[40] decision, the 25% Rule is still a legitimate starting point for apportionment.

Standards authorities.

Note 10 – The source was management of SRI.

Note 11 – No premium or discount to reflect the quality of the subject patent applications is needed because the five senior most SRI executives were unanimous in their belief that the subject patent application scored 50% in terms of its relative inventiveness.

Note		
	Siam Research and Innovation - PCC Patent Valuation	
	October 2, 2014	
	Implied Valuation of PCC Patent Application (Thailand) Based on Investment in Cambodia Cement Chakrey Ting Factory	
1	Market Capitalization of SCG (Bt.)	540,000,000,000
2	Cement Revenues / SCG Revenues	13.3%
3	Profitability Adjustment to Cement Business	50.0%
	Valuation of the Cement Business (Bt.)	107,499,856,074
4	SCG's Cement Capacity in Thailand (tons)	23,000,000
	Valuation per Ton of Cement (Bt.)	4,674
	Currency (Bt. to $)	0.031
	Valuation per Ton of Cement ($)	$144.9
	Currency (Bt. to €)	0.024
	Valuation per Ton of Cement (€)	$112.2
	Investment in Cambodia Cement Chakrey Ting Factory	
5	Consideration Invested in CCCTF	$24,000,000
5	Equity Received for Investment	40%
6	Minority Discount Factor	20%
	Valuation of CCCTF	$72,000,000
5	Daily Production Capacity (tons)	3,200
7	Days of Production per Year	360
	Annual Production Capacity	1,152,000
	Valuation of Cement Capacity - CCCTF	$62.5
8	Adjustment Factor - Difficulty of Conducting Business in Cambodia	100%
	Adjusted Value of Cement Capacity of CCCTF	$125.0
	Differential in Valuation per Ton of Cement	$19.9
	Siam Cement vs. CCCTF	
4	Tons of Capacity (Siam Cement in Thailand)	23,000,000
	Additional Value of Siam Cement Capacity	$457,495,538
9	Apportionment to Patents	20%
10	Number of Siam Cement's Patents / Patent Applications	85
11	Premium / Discount Applied to PCC Patent Application	0
	Implied Valuation of PCC Patent Application - Thailand	$1,076,460
	Currency Conversion ($ to Bt.)	32.4
	Implied Valuation of PCC Patent Application - Thailand	**฿34,877,307**
	Implied Valuation of PCC Patent Application - Thailand Rounded	**฿34,900,000**

THE INCOME METHOD

The Income Method holds that the value of an asset is the sum of the future streams of benefits that such asset will produce, discounted by a factor commensurate with the asset-holder's opportunity costs, risk of not receiving such benefit streams and the erosion of such benefits streams due to inflation. The Income Method of Analysis in this Patent Valuation Report included the review issues such as growth rates of the volumes of cement in Thailand; Siam Cement's revenue mix over time; trends in PCC pricing; cost savings during the production process; royalty rates; discount rates; and, a patent risk factor.

By application of the Income Method, the subject patent application in Thailand is expected to yield a potential Net Present Value of Bt. 300.3 million. After discounting this value by 90.5% to reflect the Patent Risk Factor, the Income Method indicates that a value of Bt. 28.5 million for the subject patent application in Thailand is appropriate.

I began the Income (or Discounted Cash Flow) Analysis by reviewing the current estimated levels of Siam Cement's sales of PCC. Below is related modeling and explanatory notes.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Income Method of Valuation

Notes		2014 (Actual) First Half	2014 (Projected) Full Year	2015 (Projected)
	(Bt. in 000,000s)			
1,2	SCG - CBM Revenues	93,890	187,780	
1	Cement Revenues (%)		33%	
	Cement Revenues (Bt.)		61,967	63,826
3	Volume Growth (2014 to 2015)			3.0%
1	Portland Cement (%)		50%	50%
	Portland Cement (Bt.)		30,984	31,913
1	Portland Cement (Bulk, %)		80%	80%
1	Portland Cement (Bagged, %)		20%	20%
4	Revenue Mix - PCC (%)			14.0%
	Revenue from PCC - Unadjusted			4,468
5	Pricing Change (2014 to 2015)			1.0%
	Revenue from PCC			**4,648**
6	**Blended Average Price of PCC Sales (Bt. Per Ton)**			**2,540**
	Tons of PCC Produced			**1,829,883**

Note 1 – The source of these numbers is SCG's management. In the case of the first-half 2014 SCG-CBM revenues the source was public disclosure of financial results.

Note 2 – Because each half of the year has one stronger quarter (quarters two and three) and one weaker quarter (quarters one and four), a doubling of first half results seems appropriate.

Note 3 – Please see related analysis on page 18.

Note 4 –. SCG's management informed me that the revenue mix for PCC is currently 10% but is expected to rise to 50% by 2020. I modeled in a 4% increase, rather than a 5% increase, to maintain a more conservative stance.

Note 5 – Please see related analysis on page 24. SCG's management told me that it expects that it will be able to achieve a price increase of Bt. 40 to 50 per ton per year. I took a more cautious stance and modeled in that prices will increase by Bt. 25.4 per ton in 2015.

Note 6 – I derived a blended average price of PCC by taking into account that SCG's management told me that it sells bulk PCC for Bt. 2,500 per ton and bagged PCC for Bt. 2,700 per ton.

The pages below illustrate the Income Method of Analysis as well as provide notes that correspond to the model.

Note 1 – The accounting industry (at least in the United States) uses 10 years as the useful life of cement.[41] In view of the innovation taking place with respect to reducing CO^2 emissions during the production of cement and the ability to design-around the subject patent applications, I am projecting that PCC will become obsolete within eight years. (While many more compelling technologies may become available sooner than eight years, due to the capital intensive nature of cement production, cement companies would wish to continue utilizing their cement plants.)

Note 2 – Please see the related analysis beginning on page 18. Siam Cement may not receive all of the revenues that it deserves as a result of corruption in Thailand.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Measures of Corruption in Thailand and Cambodia

	Corruption Perception Index	Control of Corruption	Open Budget Index	Global Competitiveness Index	Judicial Independence	Rule of Law	Press Freedom	Voice and Accountability
Country								
Thailand	102	47%	42	38	55	50%	137	30%
Cambodia	160	8%	0	122	121	4%	103	9%
Candidate Countries Reviewed	177			142	142		179	

Source: Transparency International

41 http://legislativeaudit.sd.gov/Counties/Accounting_Manual/County_Section_4/County_Section%204_Useful_Life_Table.pdf

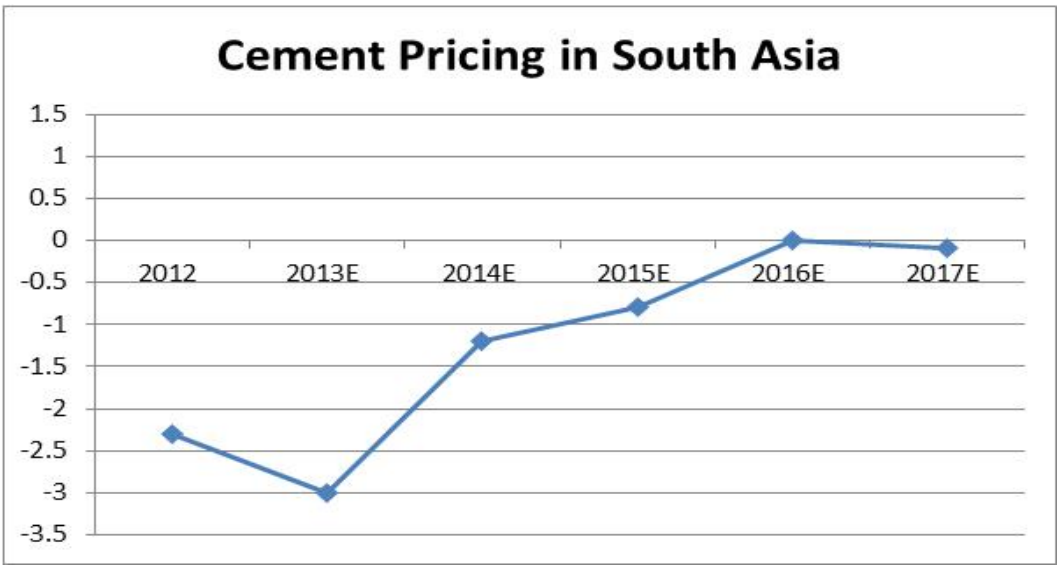
As illustrated on the chart above, Thailand does not score well in terms of corruption. There is substantial evidence that SCG has removed itself from related concerns: In addition to dedicating pages 18 through 50 of its 2013 Annual Report to Shareholders to Corporate Governance issues, that same report mentioned "ethics" 12 times, "transparency" nine times, and "integrity" seven times. Nevertheless, honorable companies that operate in corrupt environments can find themselves at competitive disadvantages: Corruption enables unethical competitors to unfairly win contracts and revenue can be deprived to companies as a result of side deals consummated by channel partners. Corruption also increases the costs of doing business.

Note 3 – The source for this information was SCG management.

Note 4 – I believe that my projections are very reasonable given that they ramp up slowly and that the PCC market share is approximately 60% in Indonesia and 70% in Vietnam, both of which sell lower quality PCC than Siam Cement's hybrid PCC.

Note 5 – With its excess capacity, Thailand remains one of the cheapest and largest cement exporters in the world, coming in behind only China and Turkey.[42] These are the two primary factors that will retard substantial price increases. First, as Thai cement facilities are operating at roughly 60% utilization, there is significant excess cement capacity in Thailand. There are 56 million tons of annual capacity in Thailand and this will rise by another four million tons per year in 2015. This additional capacity will come from TPI Prolene, Thailand's third-largest cement maker, which plans to spend $341 million from 2013 to 2016 to develop a new production line at its Saraburi cement plant.[43]

Second, Siam Cement exports roughly five million tons of cement per year, primarily to Myanmar, Laos and Cambodia. The prices realized on these exports are roughly 20% lower than the prices Siam Cement realizes in Thailand. The third obstacle to increasing prices of PCC is that many customers will not pay more for PCC than they pay for OPC.



[42] http://www.worldcement.com/asia-pacific-rim/articles/Cement_markets_Thailand_Indonesia_Vietnam_Malaysia_02132.aspx#.VAF1pGM7eVo
[43] http://www.globalcement.com/news/itemlist/tag/TPI%20Polene

Siam Research and Innovation - PCC Patent Valuation

October 2, 2014

Income Method of Analysis

Notes		2015	2016	2017	2018	2019	2020	2021	2022	2023
	(Bt. in 000,000s)									
1	Cement Revenues (Bt.)	63,826	67,018	70,369	73,887	77,581	81,073	84,721	88,110	91,634
2	Volume Growth (2014 to 2015)	3.0%	5.0%	5.0%	5.0%	5.0%	4.5%	4.5%	4.0%	4.0%
3	Portland Cement (%)	50.0%	52.0%	54.0%	56.0%	58.0%	59.0%	60.0%	61.0%	62.0%
	Portland Cement (Bt.)	31,913	34,849	37,999	41,377	44,997	47,833	50,833	53,747	56,813
3	Portland Cement (Bulk, %)	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%
3	Portland Cement (Bagged, %)	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%	20.0%
4	Revenue Mix - PCC (%)	14.0%	19.0%	24.0%	29.0%	34.0%	39.0%	44.0%	49.0%	54.0%
	Revenue from PCC - Unadjusted	4,468	6,621	9,120	11,999	15,299	18,655	22,366	26,336	30,679
5	Pricing Change (2014 to 2015)	1.0%	1.0%	1.5%	1.5%	2.0%	1.5%	1.5%	2.0%	2.0%
	Revenue from PCC	**4,648**	**6,688**	**9,257**	**12,179**	**15,605**	**18,935**	**22,702**	**26,863**	**31,293**
6	SCG's Revenue Estimates	4,734	7,476	12,032	19,506	27,065	**No Official SCG Estimates**			
	IncreMental Advantage Estimates vs. SCG Estimates									
	Bt. (in 000,000s)	-87	-788	-2,776	-7,327	-11,460				
	Percent	-1.8%	-10.5%	-23.1%	-37.6%	-42.3%				
7	Blended Average Price of PCC Sales (Bt. Per Ton)	2,540	2,565	2,604	2,643	2,696	2,736	2,777	2,833	2,889
	Tons of PCC Produced	1,829,883	2,606,832	3,554,913	4,608,221	5,788,652	6,919,955	8,174,116	9,482,658	10,829,859
8	Savings per Ton Due to PCC Production	10	11	12	13	14	15	16	17	18
	Total Savings Due to PCC Product (Bt.)	**18,298,834**	**28,675,151**	**42,658,959**	**59,906,872**	**81,041,126**	**103,799,322**	**130,785,861**	**161,205,190**	**194,937,462**
9	**Revenues from Carbon Credits**									
10	Percent of Tons of Cement Eligible for Credits								2.8%	2.8%
11	Total Addressable Tons Eligible for Carbon Credits								243,902	278,554
12	Percent of Addressable Tons Monetized Through Credits								10%	10%
	Tons Monetized Through Carbon Credits								24,390	27,855
13	Revenues per Ton of CO2 Reductions (Bt.)								196	196
	Total Revenues Received Through Carbon Credits (Bt.)								**4,788,293**	**5,468,566**
14	Total Economic Value Derived from PCC Production	4,666,202,711	6,716,241,699	9,299,230,057	12,239,154,585	15,686,077,236	19,038,421,645	22,832,583,369	27,028,695,997	31,493,072,850
15	Apportionment to Intangible Assets	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Intangible Asset Value of PCC Production	933,240,542	1,343,248,340	1,859,846,011	2,447,830,917	3,137,215,447	3,807,684,329	4,566,516,674	5,405,739,199	6,298,614,570
16	Royalty Rate on PCC Patent	2%	2%	2%	2%	2%	2%	2%	2%	2%
	Royalty Revenues Yielded by PCC Patent	18,664,811	26,864,967	37,196,920	48,956,618	62,744,309	76,153,687	91,330,333	108,114,784	125,972,291
17	Discount Rate			12%						
	Net Present Value of PCC Patent (Thailand) (Bt.)			**300,260,903**						
18	Patent Adjustment Risk Factor			90.5%						
	Net Present Value of PCC Patent Application (Thailand) (Bt.)			28,524,786						
	Net Present Value of PCC Patent Application Thailand (Rounded in Bt.)			**28,500,000**						

Note 6 – I believe that there is a great deal of integrity behind SCG's projections as SCG's numbers are incorporated into SCG's company-wide projections that are given to the securities analysts that track its shares. Nevertheless, competition with Siam City Cement should not be underestimated. (See the side-by-side analysis of Siam Cement and Siam City Cement on page 12.) Also, for the first six months of 2014 Siam City Cement's sales grew by 10% to Bt. 16.5 billion while net profit was Bt. 3.38 billion, an increase of 19.2% year-on-year.[44] At Siam Cement, first half 2014 domestic volume sales grew 2% year-over-year.

Note 7 – I derived a blended average price of PCC by taking into account that SCG's management told me that it is sells bulk PCC for Bt. 2,500 per ton and bagged PCC for Bt. 2,700 per ton.

Note 8 – SCG's management indicated to me that it believes Bt. 10 per ton can be saved in 2015 whilst producing PCC. (See related discussion on pages 38-42.) I increased this estimate by Bt. 1 per year.

Note 9 – There is currently no carbon trading in Thailand. However, Thailand's environmental performance is (perhaps surprisingly) mediocre and that nation is becoming more sensitive towards carbon emissions. (See the chart below.) Business Monitor International reports that Thailand has plans to obtain 30% of its energy demand from renewable energy sources by 2022. Also, more buildings in Thailand may go green as building owners realize that they can charge their tenants higher rental fees than in conventional grade A buildings. For instance, the Park Ventures, which is one of the green building landmarks of Bangkok, charges Bt. 1,100 per square meter per month while on average, the latest grade A buildings charge between Bt. 750-800 per square meter per month.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Environmental Performance Index

Rank (out of 178)	Country	Score	Ten-Year Change
78	Thailand	52.83	1.91%
145	Cambodia	35.44	7.52%

http://epi.yale.edu/epi/country-rankings

Thailand

Indicator	Score	Rank (out of 178)
Climate and Energy	46.05	77
Trend in Carbon Intensity	42.41	92
Change of Trend in Carbon Intensity	42.91	54
Trend in CO^2 Emissions per KWH	52.4	62
Access to Electricity	100	1

[44] http://www.aggbusiness.com/sections/general/news/thailands-siam-city-cement-higher-net-sales-profit-down-by-9/

Further, there is a good bit of anecdotal evidence that suggests that Thailand's environmental performance scores will continue to improve. (See below.) Thus, it is feasible that Siam Cement could realize some carbon trading revenue in seven years.

- Thailand now accounts for 22 LEED and TREES certified green buildings. If we add the registered green buildings not yet certified, there would be another 67 buildings to add to the list. There are two main certifications in Thailand: LEED (which is the US certification launched by the US Green Building Council) and the local Thai certification called TREES (launched by the Thai Green Building Institute).[45]

- Toyota Motor Corporation Thailand is in the process of converting its 374 existing dealerships into green buildings. Already about 30 dealerships have received the TREES certification.

- Starbucks Thailand achieved five LEED certified stores—Starbucks Crystal Design Center (Silver), Starbucks Mega Bangna (Certified), Starbucks Ban Chat (Certified), Starbucks INT Rama 3 (Certified), and Starbucks Porto Chino (Gold)—with more than ten stores developing toward the green direction and awaiting official certification.[46]

Note 10 – This represents the differential between PCC and OPC in terms of carbon emissions on a kg. of CO^2 per ton of cement basis.

Note 11 – I converted tons to metric tons, which was necessary to apply the data that corresponds to Note 13.

Note 12 – IncreMental Advantage projections.

Note 13 – Carbon credit prices are all over the map and their direction and volatility is impossible to predict. However, footnote 47 below indicates that carbon credits were trading at less than €5 per ton earlier in 2014.[47]

Note 14 – These figures are derived by adding the amounts shaded in green.

Note 15 – A list of intangible assets to which value can be apportioned is available on Exhibit C. The following are among the intangible assets that are expected to contribute to PCC sales and which, therefore, are deserving of apportionment:

> **Brand Value** SCG spends Bt. 120 million per year on brand building and Bt. 200 million per year on marketing which benefits seven brand categories. During the first six months of 2014, Bt. 40 million was allocated to promote the Tra Chang hybrid PCC brand. Tra Chang has allocated Bt. 100 million for its entire 2014 budget for its integrated marketing campaign with the purpose of reaffirming its brand and category leadership. The target groups for the hybrid PCC product are contractors, pre-casting factories and homeowners. These marketing efforts are directed, *inter*

[45] http://www.eco-business.com/opinion/reality-thailands-green-building-sector/
[46] http://www.starbucks.co.th/responsibility/environment/green-building
[47] http://www.environmentalleader.com/2014/01/09/carbon-market-value-to-climb-15-in-2014/

alia, towards billboard and television advertising as well as towards the development of a smartphone app and social media efforts.

Three years ago there was more than 90% brand awareness. According to a 2011 survey conducted by Interbrand, the total brand value of Tra Chang was $303.9 million in Thailand alone. Of this value, $197.6 million (or 65%) was due to Tra Chang's grey cement while white cement accounted for $10.4 million in Tra Chang's brand value. As illustrated below, SCG's brands generally score higher than those of its competitors.

Siam Research and Innovation - PCC Patent Valuation

October 2, 2014

Brand Value Based on 2011 Customer Survey

	Brand					
	Tiger	**Elephant**	**CPAC**	**Eagle**	**TPI**	**Supercement**
Satisfaction	4.66	4.54	4.17	4.15	3.97	3.85
Personality	4.14	4.07	3.95	3.97	3.85	3.85
Competitive Advantages	4.49	4.39	4.14	4.08	4.06	4.06
Expression	4.21	3.66	2.47	3.57	3.26	3.15

Represents SCG Cement brands.

Trademarks While we should be cautious about double-counting the apportionment to brand value and trademarks, there are a few interesting issues related to trademarks that should be pointed out. First, the Tra Chang trademark in Thailand is more than 50 years old and it underwent a redesign five years ago. The company introduced a new logo and packaging design that will be used across the range of Tran Chang Portland Cement products to give the brand a modernized image.

One illustration of the power of the Tra Chang brand is that Siam Cement's K Cement was selling for $98 a ton while Vietnam's Ha Tien cement was selling for $85 a ton in the Cambodian market. According to Chhim Maocharo, a construction material seller near Chamkar Doung, "The sales of various cements were not far different; however, K Cement was the top. It is because these products were manufactured with cooperation with Thailand's 'Elephant Trademark'."[48] This anecdotal evidence suggests that customers in Cambodia are willing to pay a 15.3% premium due to the brand equity / trademark associated with Siam Cement's elephant logo. (Perhaps, in Thailand, where Siam Cement has leveraged off of Thailand's national animal, the premium would be higher.)

Trade Secrets Evidence that Siam Cement highly values its trade secrets is that many of its relevant employees have five-year non-compete agreements, even though Thai law holds that non-compete agreements are enforceable for two years. SCG runs a seminar on intellectual property management in which a session is dedicated to the importance and protection of trade secrets. Siam Cement's plants are run under ISO protocol which calls for protection of trade

[48] http://www.phnompenhpost.com/real-estate/local-cement-production-increasing

secrets. SCG's marketing and legal departments have their own systems in place to protect trade secrets. As a result of efforts such as these, there has never been trade secret misappropriation at Siam Cement.

Governmental Approvals Siam Cement's hybrid Tra Chang Portland Composite Cement was the first brand of cement to be awarded certification by the Thai Industrial Standards Institute in May 2014. While this certification is crucial for winning contracts sponsored by the Thai government, the fact that Siam Cement earned such certification bears some relevance with other customers in Thailand, as well as with customers in countries such as Cambodia, Myanmar and Laos.

Sales Efforts There are about 120 people at Siam Cement that are active in marketing and strategic selling of cement.

Financial Management SCG manages its coal costs through a hedging program.

Customer Service At the end of the day, cement is still perceived as a commodity. Thus, customer service—such as on-time delivery—is a distinguishing factor when cement needs to be poured. (This is especially true for ready-mix cement which has a shelf life of no more than three hours.) Thus, the employees, technologies and physical assets that are to be credited with Siam Cement's 80% to 90% on-time performance (as measured by making deliveries by 8 am the next day) are deserving of apportionment.

Optionality Associated with Multiple Plants Multiple-plant firms such as SCG-CBM are at an advantage relative to single-plant firms because they have the flexibility to shift production from one plant to another.

Note 16 – Please see Royalty Rate Analysis, beginning on page 67.

Note 17 – Please see Discount Rate Analysis, beginning on page 71.

Note 18 – As discussed on page 84, the overall invention patent allowance rate in Thailand is 14.9% while the invention patent allowance rates for Thai patentees is 4.1%. The mid-point of these two allowance rates is 9.5%. I believe that that number adequately reflects the likelihood of the Thai patent application issuing, as well as the concerns that I raised in my Patent Valuation Analysis which begins on page 75.

CAMBODIAN PATENT ANALYSIS

Currently, there are no granted patents in Cambodia. There are likely to be less than 100 patent applications in Cambodia as the subject patent application was number 65 in Cambodia. I was not able to find a website for the Cambodian Patent Office, even when clicking on the purported link at the World Intellectual Property Organization's (WIPO) website.

Even if and when the Cambodian Patent Office becomes better established, the extremely high levels of corruption and extremely weak legal system in Cambodia will eviscerate the value of Cambodian patents. The chart below illustrates these points.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Measures of Corruption in Thailand and Cambodia

Country	Corruption Perception Index	Control of Corruption	Open Budget Index	Global Competitiveness Index	Judicial Independence	Rule of Law	Press Freedom	Voice and Accountability
Thailand	102	47%	42	38	55	50%	137	30%
Cambodia	160	8%	0	122	121	4%	103	9%
Candidate Countries Reviewed	177			142	142		179	

Source: Transparency International

The Cambodian Stock Exchange as a Proxy for the Cambodian Patent Office Using the development of the Cambodian Stock Exchange as a proxy for the speed and success of the development of the Cambodian Patent Office does not bode well for the value of Cambodian patents. First, more than two years elapsed since the first (the Phnom Penh Water Supply Authority on April 18, 2012) and second listing (Grand Twins International (Cambodia) PLC, actually a Taiwanese company, on June 16, 2014) on the Cambodian Stock Exchange. Second, one of the reasons cited for the lack of publicly-traded companies on the Cambodian Stock Exchange (which is a partner of the Korean bourse) is that Cambodians are unwilling to commit to transparency by providing financial statements.[49] Cambodian company owners do not understand why they have to reveal their financial statements to the public.[50] This is an important issue relative to patents: The whole notion of a patent is public disclosure.

Finally, and as another parallel with patenting, pervasive corruption has fostered a sense of distrust that is hindering the development of a local institutional investor base, despite most of the necessary regulatory framework being in place. "Foreign investors and, to my surprise, even quite a number of local investors are still questioning the trustworthiness of local companies' financial statements," said Han Kyung-tae, head of Southeast Asia investment banking at Tongyang Securities (Cambodia) Plc, who worked on the first Cambodian IPO.

[49] http://in.reuters.com/article/2014/06/16/cambodia-listing-idINL4N0OT1PK20140616
[50] http://www.ibtimes.com/lao-cambodian-stock-exchanges-stagnant-after-two-years-combined-three-companies-listed-1320809

Transacting Business in Cambodia

While the current environment in Cambodia is very bleak for patent valuation, the fact that the subject patent (should the application issue) has nearly 19 more years of potential patent life in Cambodia requires us to try to determine the likelihood of patents becoming more valuable assets over the coming years. To do this, we need to review some of Cambodia's underlying societal factors.

The following are among the challenges of transacting business in Cambodia as well as issues that could inhibit patents to become valuable assets in Cambodia:

Weak Economy The Cambodian economy's growth is very anemic. The average annual income is just under $600 for Cambodians—the second lowest in Asia. Even North Koreans are more prosperous: Their average income is almost triple Cambodia's. The war in Vietnam ended just four years before the Khmer Rouge defeat in 1979. Yet today Vietnam's gross domestic product per capita is almost ten times higher than Cambodia's.[51]

Ineffective Educational System According to author David Ayres (*Anatomy of a Crisis)*, Cambodia's traditional education system had always reinforced the concept of helplessness, the idea that a person is unable to determine their position in society.

Favorable Geography Due to Cambodia's favorable geography, which has been a consistent factor for many hundreds of years, there has been no urgency for Cambodians to behave in an enterprising manner. Each spring, when the Mekong swells, its current is so strong that it forces the Tonle Sap River to reverse course, carrying tons of rich and fertile mud, as well as millions of young fish, back up to the lake. When the lake floods, it deposits new, rich soil on thousands upon thousands of acres around its perimeter. The fish provide meals for millions of people through the year.

Severe and Intergenerational Psychological Scarring Muny Sothara, a psychiatrist in Phnom Penh, described "a household provincial survey in Kampong Cham in 2004 that showed Post-Traumatic Stress Disorder (PTSD) or symptoms of other psychotic disorders in 47% of the population." Cambodia is the only nation in the world where it has been demonstrated that symptoms of PTSD and related traumatic illnesses are being passed from one generation to the next.

Cultural Dishonesty Foreigners with long experience in Cambodia find that lying is all too common. Cambodians need first of all to save face, avoid shame and embarrassment. Cambodians also choose to shun conflict and confrontation. So if brash Westerners ask embarrassing or hostile questions, "they should not be surprised when they are told lies."

Corruption According to the U.S. Embassy in Cambodia, Cambodian government officials stole up to $500 million each and every year—about half of the state's annual budget—almost every dollar the government collected on its own. The other half of the budget consisted of donations from Non-Governmental Organizations. According to In Channy, president and CEO of Acleda Bank, "the transport costs in Cambodia are three times what they are in Vietnam. There are time delays on imports, and you have to pay a lot on the way. Customs, capital control, agriculture . . . several parties are involved," meaning several agencies are taking bribes. Similarly, in 2008 the United Nations said, "89 percent of

[51] Cambodia's Curse: The Modern History of a Troubled Land by Joel Brinkley (Most of the information relating to Cambodia in these pages comes from this source.)

encounters with the traffic police resulted in a bribe."

When the World Bank gave the Cambodian government $11.9 million for seven major rural sanitation projects, in short order the bank found that the money was being squandered in a typically Cambodian festival of corruption. This included "solicitation and acceptance of bribes as a condition for allowing companies to participate in bidding, rigging of bids for construction contracts and manipulation of procurement, fraudulent bid securities, price fixing and collusion to manipulate tenders, inflated bid prices, fixed outcomes of competitive procurement procedures, and submission of fraudulent bids by unqualified bidders who misrepresented both their financial statements and prior experience."

Corruption is not likely to disappear anytime soon in Cambodia as it is ingrained in children from an early age. According to former American ambassador to Cambodia, Charles Ray, payments students make to teachers each morning, starting in the first grade, "suggest that children as young as six are already being schooled in the art of corruption and bribery."

Cash Economy Cambodia's economy operates largely on cash which hinders accountability. According to In Channy, president of Acleda Bank, "77% of the economy works on cash." Kang Chandararot, head of the Economics Unit at the Cambodia Institute for Development Study, worried about a related problem. "The prevailing risk," he said, "will continue to be conflict of interest in general. Most Cambodian companies have two sets of books….Living without corruption, that's impossible for Cambodians. It's just not possible. You are not Cambodian, so you cannot understand."

Low Baseline for Acceptable Behavior The Government of Cambodia has been able to legitimize its corrupt behavior to its benefactors by pointing out the low baseline for acceptable behavior set by the Khmer Rouge. The message is, "What's a little corruption? At least we are not committing full-scale genocide."

ROYALTY RATE ANALYSIS

I conducted a search for licensing agreements that could be considered comparable to the invention covered by the subject patent application filed in Thailand. The conclusion of this analysis is that a royalty rate of 2.0% is warranted.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Comparable Royalty Rate Analysis

Description of Subject Technology	Licensor	Licensee	EffectiveDate	Term	Territory / Exclusivity	Agreement Base	Value	Royalty Weighting	Analysis
Supercrete Product (concrete products, in particular superconcrete admixtures capable of escalating compressive strengths and bulk properties of regular concretes).	ORLANDO A. BATTISTA, RESEARCH SERVICES CORPORATION	SUN CASTLE INVESTMENTS LIMITED	06/24/1994	Life of any patent plus 21 years.	Worldwide / Exclusive	Gross Sales	2% and $5,000 per month	1	This is an extremely dated agreement. The technology is relevant. The agreement included a consulting fee.
Carbon nanotubes.	SGK NANOSTRUCTURES INCORPORATED	NANODYNAMICS, INC.	12/15/2004	Until the last claim of any patent included in the Licensing Agreement expires.	Worldwide / Exclusive	Net Sales	5% of Net Sales up to $500,000; 2% of Net Sales over $2,000,000; 20% of sublicensing fees	1	This is a very dated agreement. The technology is mildly relevant. The royalty rates descend from 5% to 2%.
Relating to the manufacturing process for producing Wood Concrete and lightweight concrete made out of wood or vegetable fibres bound with cement, as well as building blocks, slabs and other products and materials.	DURISOL INTERNATIONAL CORP., DURISOL RESOURCE INC.	Smith-Midland Corporation	01/1/1999	Five years.	Virginia, District of Columbia, United States	Per Day	$500 per unit;	0	The consideratation is not instructive.
The Chemcrete primary additive, the primary component of Supercrete Product necessary for its manufacture and production.	Supercrete N/A Limited	G.R.B. TECHNOLOGIES INC.	11/30/1995	One year but automatically renewable from year to year thereafter, subject to the purchase of a minimum of 40,000 lbs. of product.	Dominion of Canada / Exclusive	Set Installment	Four payments of $250,000 each	0	The consideratation is not instructive.
"Cellular Concrete Technologies Technology" as described in Patent No. US 5,900,191 entitled "Foam producing apparatus and method"; Patent No. US 6,046,255 entitled "Foam and foam/cement mixture"; US Patent Application No. 13/560,882 entitled "Foam Production System & Method"	Cellular Concrete Technologies, LLC	Cellular Concrete Technologies, Inc.	11/04/2013	30 years.	Worldwide / Exclusive	Gross Revenues	0.25%	0	This appears to be an intracompany transaction and therefore not instructive.
Weighted Average Royalty Weight								**2.0%**	

However, I do not believe that these licensing agreements are exceedingly comparable to the invention covered by the subject patent application. In view of my concerns about the comparability of the reviewed licensing agreements, I derived royalty rates based on Black-Scholes Option Analysis. This analysis, presented below, also suggests that a 2.0% royalty rate is appropriate.

Black-Scholes Implied Royalty Rate Analysis

Below is the Black-Scholes Implied Royalty Rate Calculation. The formula for this permutation of Black-Scholes is provided in Exhibit D.

Siam Research and Innovation - PCC Patent Valuation		
October 2, 2014		
Black-Scholes Royalty Rate Calculation		
Notes		
1	Long-Term Operating Profit Ratio of Commercializer	17.0%
2	Volatility (Industry)	15.1%
3	Remaining Life of Patent / Technology	8
4	Risk Free Rate	2.70%
	Implied Royalty Rate	**2.0%**

Below are notes related to the above analysis:

Note 1 – For calendar 2013, Siam Cement report an EBITDA margin of 15%. (See page 11.) This margin is clouded by business interests other than cement. Thus, in attempting to determine the margins for Siam Cement's cement business, it is instructive to review Siam City Cement's profit margins as that company is a purer play on cement in Thailand. Siam City Cement's five-year net profit margins were 15.2%. (See page 12.) Siam City Cement's operating margins would necessarily be much higher. Thus, a 17% long-term operating profit margin is conservative.

Note 2 – I used the Rule of 16 Method to calculate the volatility of the recent stock market performance of four publicly-traded companies comparable to Siam Cement. I chose not to use SCG's shares in this analysis because cement only represents 13.3% of SCG's company-wide revenues.

I used Siam City Cement's stock performance in this analysis because it is a relatively pure play on the cement industry in Thailand. Centex's volatility was derived in this analysis because it is a relevant player having acquired Saraburi Cement Company and as it operates in many other countries similar to Thailand. I used Vicat Group (of France) and Dangote (of Nigeria) because their cement production

capacities were reportedly similar to that of Siam Cement: Vicat was said to have a production capacity of 25 million tons of cement per annum while Dangote Cement was said to have a production capacity of 20 million tons of cement annually.[52]

Note 3 – As discussed on page 57, I believe that should the subject patent applications issue, they would have eight years of useful life.

Note 4 – The yield on the ten-year Thailand Government Bond was 3.37% as of September 2014.[53] Thus, 80% of this rate (reflecting the useful years of the patent application) is 2.7%.

Conclusion of Royalty Rate Analysis Both the comparable royalty rate analysis and the Black-Scholes Implied Royalty Rate analysis suggest that 2.0% is a reasonable royalty rate. Further, a 2.0% royalty on the subject patent application equates to 10% (2% / 20%) of the apportionment to intangible assets which seems reasonable.

[52] http://www.globalcement.com/magazine/articles/822-top-75-global-cement-companies
[53] http://www.tradingeconomics.com/thailand/government-bond-yield

Siam Research and Innovation - PCC Patent Valuation

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Calculation of Volatility

Siam City Cement			Absolute	Cemex			Absolute	Vicat Group			Absolute	Dangote			Absolute
Date	Thailand	Change	Change	Date	NYSE	Change	Change	Date	Paris	Change	Change	Date	Lagos	Change	Change
	SCCC				CX				VCT				DANGCEM		
													Niara		
9/30/2014	฿434	0.00%	0.00%	9/30/2014	$13.04	0.15%	0.15%	9/30/2014	51.26 €	3.43%	3.43%	9/30/2014	222.00	0.00%	0.00%
9/29/2014	฿434	0.46%	0.46%	9/29/2014	$13.02	-0.46%	0.46%	9/29/2014	49.56 €	-0.86%	0.86%	9/29/2014	222.00	0.91%	0.91%
9/26/2014	฿432	-0.46%	0.46%	9/26/2014	$13.08	-0.46%	0.46%	9/26/2014	49.99 €	-0.46%	0.46%	9/26/2014	220.00	-1.78%	1.78%
9/25/2014	฿434	0.46%	0.46%	9/25/2014	$13.14	-0.83%	0.83%	9/25/2014	50.22 €	-1.68%	1.68%	9/25/2014	223.98	-0.45%	0.45%
9/24/2014	฿432	-0.92%	0.92%	9/24/2014	$13.25	0.61%	0.61%	9/24/2014	51.08 €	0.33%	0.33%	9/24/2014	225.00	2.74%	2.74%
9/23/2014	฿436	0.00%	0.00%	9/23/2014	$13.17	-0.38%	0.38%	9/23/2014	50.91 €	-1.15%	1.15%	9/23/2014	219.00	-1.73%	1.73%
9/22/2014	฿436	0.93%	0.93%	9/22/2014	$13.22	-0.38%	0.38%	9/22/2014	51.50 €	-0.60%	0.60%	9/22/2014	222.85	-0.51%	0.51%
9/19/2014	฿432	-1.37%	1.37%	9/19/2014	$13.27	-0.38%	0.38%	9/19/2014	51.81 €	-1.24%	1.24%	9/19/2014	224.00	1.82%	1.82%
9/18/2014	฿438	1.39%	1.39%	9/18/2014	$13.32	0.30%	0.30%	9/18/2014	52.46 €	0.88%	0.88%	9/18/2014	220.00	-0.90%	0.90%
9/17/2014	฿432	0.47%	0.47%	9/17/2014	$13.28	0.76%	0.76%	9/17/2014	52.00 €	1.90%	1.90%	9/17/2014	222.00	0.91%	0.91%
9/16/2014	฿430			9/16/2014	$13.18			9/16/2014	51.03 €			9/16/2014	220.00		
Average 10-Day Volatility			0.65%	Average 10-Day Volatility			0.47%	Average 10-Day Volatility			1.25%	Average 10-Day Volatility			1.17%

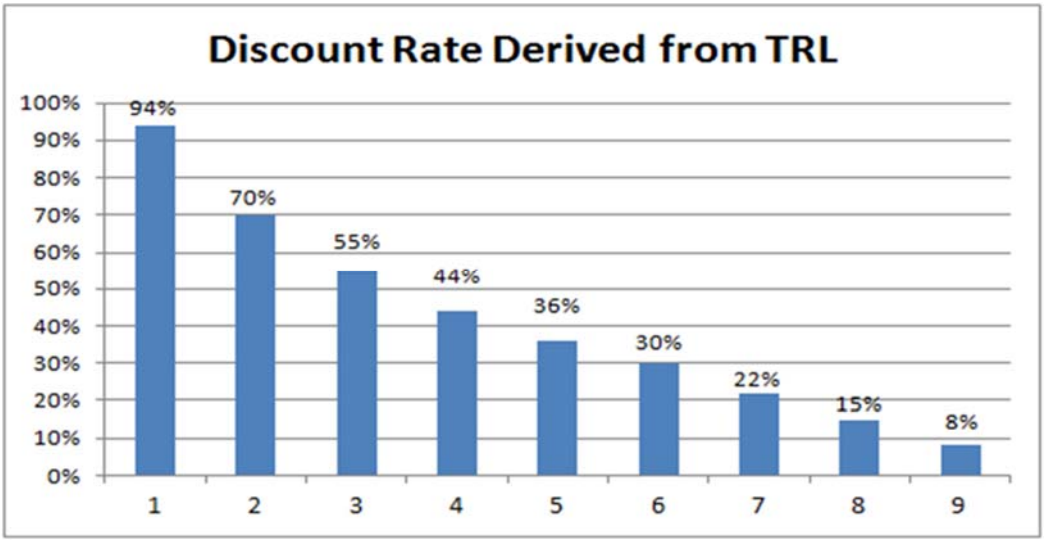
	SCCC	CX	VCT	DANGCEM
Volatility	0.65%	0.47%	1.25%	1.17%
Weightings	2	1	2	2

Weighted Average Volatility of Comparables	**0.95%**
Rule of 16	16
Volatility	**15.1%**

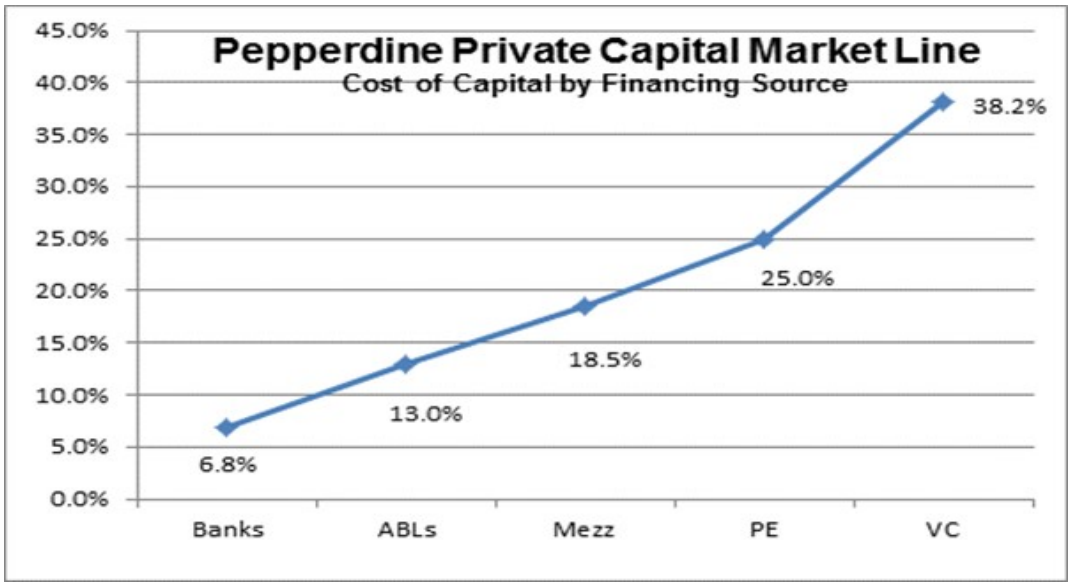
DISCOUNT RATE ANALYSIS

As Siam Cement has been producing PCC since May of 2013, the subject PCC patent applications should receive a low discount rate. One could begin the discount rate analysis by relying on guidance provided by The National Aeronautics and Space Administration's ("NASA") Technology Readiness Levels ("TRLs"). NASA uses nine TRLs to indicate where its various projects are in the commercialization process. I converted the TRL schedule into a schedule of discount rates. (The slope of the discount rates imputed on the chart below approximates guidance provided by the American Institute for Certified Public Accountants in terms of discounts that should be applied to pharmaceuticals making their way through the Food and Drug Administration's approval process. I have submitted this schedule of discount rates for peer review to many sessions of the Valuation of Emerging Technologies course that I teach on behalf of The Business Development Academy.)

NASA TRL	Definition
1	Basic principles observed and reported
2	Technology concept and/or application formulated
3	Analytical and experimental critical function and/or characteristic proof-of-concept
4	Component and/or subsystem validation in laboratory environment
5	Component and/or subsystem validation in relevant environment
6	System/subsystem model or prototype demonstration in a relevant environment
7	System prototype demonstration in an operational environment
8	Actual system completed and "mission qualified" through test and demonstration in an operational environment
9	Actual system "mission proven" through successful mission operations



It is my opinion that at Siam Cement's current stage of developing PCC, the subject patent application warrants a TRL score of 9. Thus, the TRL analysis suggests that a discount rate of 8% is appropriate. This discount rate approximates the appropriate discount rate as per the Pepperdine Private Capital Market Line Survey.



According to a recent Pepperdine Private Capital Market Line Survey, traditional banks seek a 6.8% return on their investments while asset based lenders seek a 13% return on their investments. Thus, the strict application of the TRL and Pepperdine Private Capital Market Line Survey would suggest that a discount rate in the 9% or 10% range is appropriate. Nonetheless, I am raising this discount rate to 12% because of the inherent risks of the subject PCC patent application being 100% exposed to the Thai economy at this time. That there is a degree of instability in Thailand was illustrated earlier in 2012 when there was a regime change. Also, it should not be forgotten that Thailand was the country where the Asian financial crisis began in the late 1990's.[54]

[54] How Asia Works: Success and Failure in the World's Most Dynamic Region by Joe Studwell

VALUATION OF THE SUBJECT PCC PATENT IN CAMBODIA

I believe that the subject PCC patent application filed in Cambodia has a value of Bt. 0.

SRI's management indicated to me that PCC has not launched in Cambodia and that Siam Cement has no plans to sell or manufacture PCC in Cambodia for the next five years. Siam Cement may never decide to manufacture or sell PCC-related cement in Cambodia. Even if Siam Cement attempts to sell PCC in Cambodia in five years, its efforts might face delays. For the reasons discussed in note 1 on page 57, the maximum useful life of PCC cement is eight years. This means that the window of opportunity to recover damages for infringement of the subject patent (should it issue) is three years, from 2020 to 2023. The following are among the reasons that no damages awards may be collected from infringers during the 2020 to 2023 time period:

- The patent application may not issue. Even assuming that the Cambodian Patent Office will become operational over the next few years, no one knows what the patent application allowance rate will be in Cambodia. However, the allowance rate for patent applications in Thailand ranges from 4.1% to 14.9%. (See page 84.)

- There may never be any suspicion of infringers in Cambodia. This scenario is very possible given that the primary benefit of PCC is its ability to reduce CO^2 emissions and that there is neither a pricing advantage of so doing nor any interest in Cambodia for reducing CO^2 emissions. As can be observed on the chart below, there is no effort to even collect (let alone monitor or manage) statistics related to carbon usage or climate change in Cambodia.

Siam Research and Innovation - PCC Patent Valuation
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Environmental Performance Index

Rank (out of 178)	Country	Score	Ten-Year Change
78	Thailand	52.83	1.91%
145	Cambodia	35.44	7.52%

http://epi.yale.edu/epi/country-rankings

Cambodia

Indicator	Score	Rank
Climate and Energy	Not Available	
Trend in Carbon Intensity		
Change of Trend in Carbon Intensity		
Trend in CO^2 Emissions per KWH		
Access to Electricity	31	147

- If there is suspicion of infringement in Cambodia, it would be extremely difficult to prove such infringement. (See page 80.)

- If it becomes possible to demonstrate infringement of the subject patent application in Cambodia, Siam Cement may not wish to assert its patent. Reasons may range from the extent of believed infringement being too small to merit assertion, to fear of retaliation if the believed infringer is a competitor in other markets or if the believed infringer is a partner of the Cambodian government.

- If it becomes possible to demonstrate infringement of the subject patent application in Cambodia and Siam Cement wishes to assert such patent, the rule of law, laws governing patent enforcement and courts for hearing patent enforcement may not be equipped to render verdicts on such issues.

- If assertion is brought before a legitimate court of law, Siam Cement could lose the case.

- If Siam Cement proved that infringement took place between 2020 and 2023 and won the related litigation, it would be difficult to calculate high damage awards due to the tenuous immediate financial benefits of PCC.

- If Siam Cement won such litigation and received a substantial damages award, there is no guarantee that such amounts would be collected by Siam Cement.

ANALYSIS OF SRI'S PCC PATENT APPLICATIONS

Below is my analysis of the SRI's PCC patent applications. These patent applications are entitled "Mixed Cement Formula Proving Compressive Strength Comparable to that of Portland Cement." One of these patent applications was filed with the Department of Intellectual Property in Thailand on May 16, 2013. The related patent application number is 1301002571. The second patent application was filed in Cambodia on October 28, 2013 and that application number is 00065. This analysis is reflected in discounts applied in the Income Method of Valuation. (See note 18 on page 63.) These patents applications have been scrutinized with The Patent Valuation Gauntlet™.

To summarize, I believe the subject patent applications were well-written by a very qualified patent lawyer and patent engineer, have broad claims, and have high sustainability in opposition scores. There are no encumbrances on the patent applications and the chain of title is clean. Further, the subject patent applications are invention patents, higher quality than "pretty patents" or "design patents". However, among my concerns relative to the subject patent applications are the long pendency periods; low patent allowance rates (especially for Thai applicants) in Thailand; the difficulty of detecting infringement; and, the challenges related to enforcing patents in Thailand and especially Cambodia. I am also concerned about the relatively small amount of prior art disclosed.

Summary of Patent Applications The abstract for the two subject patent applications is provided below:

> The mixed cement formula providing the compressive strength comparable to that of Portland Cement is the invention of mixed Portland Cement by mixing ground inertia materials having a specific characteristic in increasing the early compressive strength to the cement and/or mixing certain chemical substances in order to obtain the late compressive strength comparable to that of commonly manufactured Portland Cement. Since the ground inertia materials naturally occur and have not been under the burning process are then used in substitution for clinkers, this process, therefore, can help reduce the amount of clinkers required in manufacturing Portland Cement. Therefore, the mixed cement formula also helps reduce the release of carbon dioxide gas as well. The techniques used include the Nucleation Effect, the Filling Effect, Ettringite Stabilization, and New Phase Formation.

Patented Subject Matter The following are among the objects of the invention described in the subject patent applications:

- Obtain the mixed cement formula that provides a better early compressive strength when compared to that of Portland Cement.
- Obtain mixed cement having a better abrasion resistance when compared to that of Portland Cement.
- Obtain a bleeding value lower than that of Portland Cement.
- Obtain reductions in the release of carbon dioxide as such formula utilizes a lesser amount of clinkers and adds calcium carbonate in substitution thereby reducing the use of the energy for fuel combustion required in manufacturing clinkers.

Impact of Novelty Analysis While there are a variety of benefits associated with the subject invention, the primary innovation addressed is the reduction in the release of carbon dioxide. This is an important innovation as there is a tremendous amount of carbon dioxide released during the production of Ordinary Portland Cement. Such release is a major contributor to climate change which is at the top of the agendas of leaders from countries across the globe. (In fact, as I am writing this, the United Nations is hosting its 2014 Climate Summit.) However, there are many other initiatives occurring around the world to reduce the release of CO^2 during the production of cement. In addition to the innovations directed to reduce CO^2 emissions discussed on pages 28-29, HeidelbergCement's CEMROC® generates around 95% less CO^2 than traditional Portland cement. Many other examples abound.[55]

Further, the subject invention is not terribly innovative as senior executives from SRI have stated that the subject patent applications reflect SRI's efforts to catch up with other PCC products that have already reached the market. When I asked the five senior most SRI executives to rate the inventiveness of the subject patent application (as compared to all of the other cement innovation they have seen over their careers) on a scale from 1 to 100, the response was "50".

Four patents were cited by the applicant as prior art. Usually, a low incidence of prior art citations suggests novelty. However, it is premature to come to this conclusion as prosecution (and examiner searches) have not begun. Also, the late priority date of May 16, 2013, together with the disclosed prior art having an average age of 13 years, suggests that the invention is not terribly innovative.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Age of Prior Art Analysis

Prior Art Reference	Inventors	Date of Prior Art	Age of Prior Art (Years)
JP16059	Minoru Morioka Yasuhiro Nakajima	2001	13
WO1997021637(A1)	Flamming Hisne	1995	19
US5584926 (A)	Hans E. Damtof Joseph Damtof	2001	13
KR2208102114A	Mun Jee Young Kim Jin Su	2007	7
Average Age of Prior Art			**13**

[55] For example, HeidelbergCement is very active in reducing CO^2 emissions by reducing clinker content. The following is from that company's 2013 Annual Report: We have made further progress in the development of cements with less clinker, thereby achieving a reduction in both CO^2 emissions and costs. In Norway and Sweden, we are making use of the positive interaction between fly ash and limestone. In Norway, the clinker proportion in standard cement is thus reduced by 4%; in Sweden, the switch from pure limestone cement to this combination saves even 10%. In Germany, we were able to significantly reduce the average clinker content in cement by almost 5% to 73% thanks to a series of product optimizations. Based on an altered chemical composition and low burning temperatures, CO^2 output is 30% lower in comparison with conventional clinker and energy consumption is reduced by around 10% to 15%. The basic technology is protected by various patent applications.

Title Analysis The title of the subject patent application "Mixed Cement Formula Proving Compressive Strength Comparable to that of Portland Cement" is moderately clear and descriptive. It would have been clearer if it mentioned the reduction of carbon dioxide emissions. Thus, it is reasonable to believe that the patents will be reviewed by an examiner in the appropriate art unit. Also, the title of the patent application scores satisfactory in terms of putting potential infringers on notice as to the content of the patents.

Analysis of the Summary of the Invention The Background of the Invention and Objectives of the Invention section of the patent application were well-written summaries of the claimed invention (and should be relatively understandable to members of juries). Definitions of technical terms were not placed in the Background which is positive as it indicates sound patent drafting.

Description Analysis The description of the invention was thorough and satisfactorily-written. I believe the best mode requirement was adequately addressed. The teachings contained in the description did not exceed the scope of the claims which is accretive to patent value since no proprietary knowledge was divulged other than in the claims.

Drawings Analysis The subject patent application contained three figures on one page and four tables on two pages. These drawings support the descriptions. Given that one independent claim is a composition of matter claim while the other independent claim is a method claim, drawings analysis is not determinative of the value of the subject patent applications.

Claims Analysis When submitted for examination, the subject patent application contained 18 claims, two of which were independent and 16 of which were dependent claims. One of the independent claims is a composition of matter claim while the other independent claim is a method claim.

Further:

- The claims were concise and well-written.
- I believe that covering the inventions with multiple claims will yield more strength to the patent applications as more infringers can be ensnared by either the composition of matter or method claims. Also, the dependent claims add strength to patents since they add clarity to the inventions and since dependent claims can become independent claims if their related independent claims are cancelled. Further, there was a very high incidence of the dependent claims referencing multiple dependent claims above which accrues to claims strength.
- The claims have very few embodiments. Having a small number of embodiments renders patents easier to infringe since infringement must occur across all of the embodiments associated with a particular claim.
- When used, the preambles were concise. The preamble of the subject patent application used the transitory word "comprising" which usually is indicative of broad claims scope.
- The claims were supported by the descriptions.
- The claims appear to be in proper formats and appear to meet statutory standards. The claims appear to be properly dependent.

- There is consistency between the claims and the descriptions in terms of terminology and scope.
- Most of the claims used comparative words which is not advised.
- In general, the claims do not appear to have unnecessary limitations.
- I did not see the use of adjectives or adverbs used in the claims to any extent.
- I did not see the use of trade-names, identified as such, in the claims.
- I did not encounter the phrases "in this invention" or "in the present invention" in the subject patent application which accrues to claims strength. Such phrases may be used by a court to limit the scope of the patent.
- I do not believe that the patent applications have shifting terminology risks. Shifting terminology risks arise when a claim uses two phrases for the same idea, or one phrase for two different ideas, in a way that makes understanding of the claim difficult or even impossible.
- I believe that the usage of the key terms are in keeping with industry standards. This clarity is positive for comprehension and interpretation.

Chain of Title Analysis All four inventors signed invention assignment agreements when they executed their employment agreements. Further, inventor assignments are required to be submitted together with patent applications in Thailand.

Chain of title analysis is important because there is a high correlation between patent assignments and litigation.[56] Further, it is my understanding that no third parties have—or are contemplating—taking a secured interest in the subject patent applications. This adds to patent strength given that there is a correlation between borrowing against patents and patent litigation.[57] To my knowledge, there are no chain of title risks associated with:

- The patent application being funded by any government or any government agency.
- Research being conducted at universities.
- Acquiring the patent application from companies for which the patent(s) was the primary asset.
- Acquiring the patent application from married inventors from community property jurisdictions.
- Acquiring the patent application from inventors who had side revenue participation interests in the patents.

Presumption of Validity Analysis As the patent applications have not yet issued, presumption of validity analysis is premature.

[56] Bessen, James (2008) "The value of U.S. patents by owner and patent characteristics," Research Policy, 37, pp. 932-45.
[57] Predicting Patent Litigation, Colleen Chien, Santa Clara University School of Law, January 1, 2011. http://digitalcommons.law.scu.edu/cgi/viewcontent.cgi?article=1165&context=facpubs

Design-Around Risk The claims in the subject patent applications are relatively broad and the patent applications have not yet been published. These issues argue in favor of difficulty in designing around the patent applications. Nevertheless, it would be relatively easy to design-around the subject patent applications because a small change in the raw materials used can be beyond claims.

Opposition Analysis As the patent applications have not yet been published, they have not been challenged. Since there are four inventors listed on subject patent applications, the subject patent applications deserve low sustainability in opposition scores. In other words, since there are four inventors listed on the patent applications, there is a notable risk of conflicting depositions during any possible attempts to invalidate the patents. Having so many inventors potentially deposed during opposition proceedings could result in at least one of them making statements that could jeopardize the patent applications.

In Thailand, patent applications can be challenged within a 90-day window after publication by anyone. Post-issuance, patents can be challenged by interested parties.

Abstract Analysis At least in terms of United States Patent and Trademark Office (USPTO) standards, the subject patent abstract was well-written. Below are the five most common reasons for the USPTO objecting to abstracts, together with commentary regarding the subject abstract.[58]

Reason for USPTO Objection	Commentary Relative to Subject Patent Abstract
The Abstract is not on a separate sheet.	The subject Abstract is on a separate sheet of paper.
The Abstract is too long/too short.	At 129 words and 10 lines, the subject Abstract is between 50 and 150 words and does not exceed 15 lines.
The Abstract includes improper language.	The Abstract is clearly written. It does not include the phraseology commonly found in claims. The Abstract avoids phrases that can be implied.
The Abstract is non-narrative/non-descriptive.	The Abstract efficiently describes the disclosed subject matter and encompasses what is believed to be novel. While the Abstract discusses purported merits of the invention, it does not discuss speculative applications of the disclosed inventions, nor does it compare the inventions with prior art.
The Abstract is more than one paragraph.	The Abstracts are one paragraph.

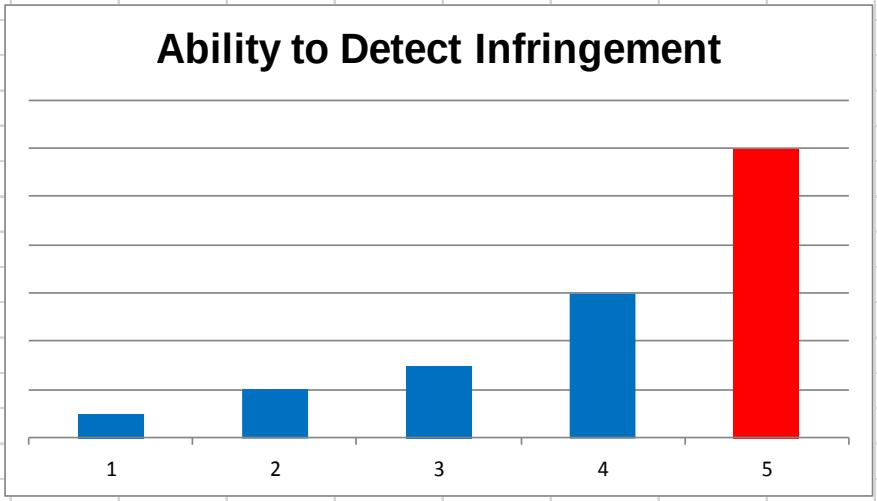
[58] http://patentablydefined.com/2009/09/28/patent-abstracts-common-problems-with-them-and-tips-for-drafting-a-better-abstract/

Inequitable Conduct Risk Inequitable conduct risk analysis is premature.

Likelihood of Infringement Analysis It is not believed that the subject patent applications are currently being infringed. It is believed that SCG's two largest competitors in Thailand are not currently capable of infringing the subject patent applications. Siam City Cement—inasmuch as I can determine—does not conduct cement research in Thailand. Further, Siam City Cement's R&D budget is not completely directed to cement innovation as that company is involved in researching other building materials such as those for roofing applications. (Siam City Cement only has four patents, two of which are in biomass. Only two are tangentially related to cement.) Similarly, TPI Polene does not have a cement research initiative in Thailand, rather only in collaboration with Holcim outside of Thailand.

Nevertheless, Mr. Phanitphotchamarn believes that in four years competitors such as those mentioned above will be capable of infringing the subject PCC patent applications. Interestingly, competitors have demonstrated an interest in infringing SCG's intellectual property as the trademark relating to Siam's Super Cement was infringed within two weeks of the launch of that product in 2009.

Infringement Detection Analysis I believe the ability to detect infringement of the subject patent applications rates the lowest score possible, at "5", as per the chart below.



Level	Explanation
1	The invention can be detected without possessing an accused device.
2	The invention can be detected easily with typical consumer use of an accused device.
3	The invention can be detected with commonly available test equipment and technicians, but no significant expense.
4	The invention can be detected only with specialized, uncommon test equipment or inordinately expensive procedures.
5	The invention can only be detected by the admission of an accused infringer.

It is difficult to observe infringement of the subject patent applications because when cement is prepared the additives hydrate. When one looks at finished concrete, the portion of the additives used is reduced to only 1% to 2% of the mass of concrete. At the finished state, one cannot determine which components were used in producing that cement and what one sees is overwhelmingly carbon. According to Dr. Tang, even if powerful inspection equipment were to be used, the composition of the formulation of a suspected infringer's cement may be difficult to determine.

Encumbrance Analysis There are no encumbrances—such as prior licenses; settlements; covenants not to sue; obligations under licensing to standards programs; or, liens—placed on the subject patent applications.

Patent Expiration Analysis Based on the filing dates for the subject patent applications, the resulting patents (should they issue) should endure until May 16, 2033 in Thailand and October 28, 2033 in Cambodia. This timeframe could be extended if there are delays during prosecution or could be reduced if there are terminal disclaimer issues. SCG seems to be dedicated to keeping the patents (should they issue) in force by paying the required maintenance fees which, based on current costs, could be Bt. 152,000. I believe that the professionalism of the staff at SCG Legal will prove quite capable of calendaring and remitting payment for the appropriate maintenance fees. (Please see Exhibits E and F for current maintenance fees in Thailand and Cambodia.)

Patent Enforcement Analysis It is difficult to enforce patents in Thailand. Assuming that there is a valid and enforceable patent in Thailand under which a dispute arises, all patent infringement actions in Thailand fall within the jurisdiction of the Thai Intellectual Property and International Trade Court (IP & IT Court). That court has the authority not only to hear complaints relating to registered patents in Thailand, but also to grant other interim relief, including a preliminary injunction and an order for search and seizure of evidence of infringement (i.e., an Anton Piller order, so named for a famous 1976 case in England).

One reason that it is difficult to enforce patents in Thailand is that to secure an injunction in Thailand, the patentee must prove damages which requires a substantial burden of producing evidence. As a result of such challenges, only a few patent cases have been brought to the Supreme Court of Thailand.

Further, SCG does not have a great deal of experience in enforcing its patents. Over the last two to three years, less than 10 of SRI's 85 patents (including applications) are believed to have been infringed. In only one instance was a cease and desist letter sent to the alleged infringer. The other acts of alleged infringement were deemed to be immaterial acts committed by companies that were too small to pursue. It is my understanding that there are between 5 to 20 criminal cases per year and 5 to 15 civil cases per year relating to intellectual property disputes in Thailand.

Nevertheless, as indicated on the chart below, more patent enforcement options exist in Thailand than in Indonesia, Malaysia, the Philippines and Vietnam. Based on the analysis below, it appears that criminal prosecution for patent infringement, which could result in imprisonment, is more likely to occur in Thailand than in any of the aforementioned Southeast Asian countries. Further, greater understanding among the judiciary and training from overseas patent offices are paying dividends, making the IP & IT court an increasingly attractive venue for litigation. [59]

(Interesting, but not highly relevant, is that EMC Cement B.V. from Sweden recently withstood invalidity attempts against its cement patents.)[60]

[59] http://www.iam-magazine.com/patent1000/rankings/detail.aspx?g=19869c97-342c-486a-bc71-25aae18f3204

[60] http://www.emccement.com/landing4_1a.htm

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Remedies Against Infringers in Southeast Asian Countries

SE Asian Country	Preliminary Injunction	Anton Pilar Order (or Similar)	Mareva Injunction	Damages	Criminal Action	Other Comments
Indonesia	Cannot be obtained			X	X	Difficult to calculate damages
Malaysia	X	X	X	X		Other interim orders available
Philippines	X			X	If there is repetition of infringement	Search and seizure (raid); condemnation and destruction of infringing articles
Thailand	X	X	X - difficult to obtain	X	X	Forfeiture of goods; fines; imprisonment in criminal cases
Vietnam	X			X		Seizure and attachment

Source: Enforcing and Litigating Patent Issues in China and Southeast Asia, Baker & McKenzie, October 1, 2013

For a review of the procedural issues involved in enforcing patents in Thailand, please see Exhibit G. For a review of the procedural issues involved in enforcing patents in Cambodia, please see Exhibit H.

Other indicia that Thailand is becoming more sophisticated about protecting patents is that it has a growing vested interest in doing so. The number of utility patent filings increased by 10.7% in 2012 in Thailand.[61] This growth in the number of patent filings in Thailand is partially the result of Thailand's accession to the Patent Cooperation Treaty (PCT) in 2010 and entrance into national phase in June 2011.

Also, the Department of Intellectual Property in Thailand has its own Intellectual Property Capitalization project that, as of early 2008, had used intellectual property for loan collateral totaling more than Bt. 75 million ($2.25 million).[62] While I do not know the current status of that initiative, inasmuch as I can determine, the Thai effort to facilitate the use of intellectual property as collateral for loans predated any similar efforts by the United States government or the Intellectual Property Office of Singapore whose similar program is just now in the process of being launched.

Finally, Thailand's Department of Intellectual Property 2012 Annual Report lists many training efforts to combat infringement and raids conducted on suspected infringers. As per the chart below, Thailand has become quite active in making arrests and asset seizures in connection with infringement of intellectual property rights.[63]

61 http://www.toolipvaluation.com/blog/global-patent-applications-see-fastest-growth-in-18-years/
62 http://www.ipthailand.org/ipthailand/index.php?option=com_content&task=view&lang=en&id=604
63 http://www.ipthailand.go.th/en/images/Anual/DIPAR2012.pdf , page 105

สถิติการจับกุมการละเมิดทรัพย์สินทางปัญญา (ลิขสิทธิ์ เครื่องหมายการค้า สิทธิบัตร และกฎหมายอื่นที่เกี่ยวข้อง)

Statistics of Suppression of Intellectual Property Rights Violation (Copyright, Trademark, Patent and Other laws)

ละเมิดตาม พ.ร.บ. Offences Under	2555 / 2012	
	คดี (ราย) Arrests	ของกลาง (ม้วน/ชิ้น) Materials Seized
พ.ร.บ. ลิขสิทธิ์ พ.ศ. 2537 Copyright Act B.E. 2537	4,917	3,851,578
พ.ร.บ.เครื่องหมายการค้า พ.ศ.2534 แก้ไขเพิ่มเติมโดย พ.ร.บ.เครื่องหมายการค้า (ฉบับที่ 2) พ.ศ. 2544 Trademark Act B.E. 2534	4,788	2,687,925
พ.ร.บ.สิทธิบัตร พ.ศ. 2522 แก้ไขเพิ่มเติม โดยพ.ร.บ.สิทธิบัตร (ฉบับที่ 2)พ.ศ.2535 และพ.ร.บ.สิทธิบัตร (ฉบับที่3) พ.ศ. 2543 Patent Act B.E. 2535	24	4,859
กฎหมายอื่นที่เกี่ยวข้อง (พ.ร.บ.การผลิตผลิตภัณฑ์ซีดีฯ,พ.ร.บ.ภาพยนตร์และวีดีทัศน์ฯ, พ.ร.บ.คุ้มครองผู้บริโภค,ประมวลกฎหมายอาญา) Other laws (Optical Disc Production Act Film and Video Act, Consumer Protection Act Penal Code)	200	257,662
พ.ร.บ. ศุลกากร พ.ศ. 2469 The Customs Act, B.E. 2469 (1928)	837	367,800
รวม / Total	10,766	7,169,824

Prior Art Analysis It is the policy of SRI to have two prior art searches conducted for each patent application that SRI files. The first prior art search is conducted by the inventor before submitting his Invention Disclosure to a Managing Director. During these initial prior art searches, thirty percent of the presumed inventions are shelved and do not proceed to the patent application drafting stage. The second prior art search is conducted by the patent lawyer during the patent application drafting stage.

In the case of the subject patent applications, Mr. Chantratree conducted the in-house prior art searches. These prior art searches were conducted in both the English and Thai languages. He used Thomson Reuters Innovation, Google Scholar, Espacenet, the USPTO and ScienceDirect. The prior art that surfaced during these searches was disclosed in the patent application.

Four patents were cited by the applicant as prior art. However, additional pieces of prior art could be produced by the examiner—or challengers to the subject patent applications—once the examination begins. The late priority date of May 16, 2013, the advanced age of the disclosed prior art, the breadth of the claims and the fact that various forms of PCC are being used by other companies could suggest that

other pieces of prior art could be produced. Further, I found it surprising that no non-patent pieces of prior art were submitted by the applicant.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Age of Prior Art Analysis

Prior Art Reference	Inventors	Date of Prior Art	Age of Prior Art (Years)
JP16059	Minoru Morioka Yasuhiro Nakajima	2001	13
WO1997021637(A1)	Flamming Hisne	1995	19
US5584926 (A)	Hans E. Damtof Joseph Damtof	2001	13
KR2208102114A	Mun Jee Young Kim Jin Su	2007	7
Average Age of Prior Art			**13**

Prosecution History Analysis Prosecution of the subject patent applications has not yet begun. Publication of patents takes approximately three years in Thailand while patent pendency is more than five years. The growth in patent filings in Thailand and possible examiner resistance to accelerating the review process (because the examiners may be envious of the disparity in salaries between SRI researchers and the examiners) should cause the subject patent applications to experience industry average review periods and success rates.

Patent Issuance Risk Factor Although Thailand's Department of Intellectual Property does not specifically reveal its patent allowance rate, I calculate that the invention patent allowance rate in Thailand is 14.9%. This is because the number of patent applications filed was 6,758 in 2008 while, five years later, the number of patents granted in 2012 was 1,008. The statistics for invention patent allowance rates for Thai patentees is even worse at 4.1%. I calculated the Thai invention allowance rate when considering that the number of invention patent applications filed by Thais was 951 in 2008 while, five years later, the number of invention patents granted in 2012 was 39.[64]

Forward Citation Analysis Forward citation analysis is premature.

Classification Analysis Classification analysis is premature.

Technology Cogency Analysis Technology cogency holds that the more inventors listed on the patent, the stronger and more persistent the underlying science becomes. As there are four inventors listed on the subject patent applications, those patent applications have high Technology Cogency scores.

[64] http://www.ipthailand.go.th/en/images/Anual/DIPAR2012.pdf , page 96

Translation Error Risk I do not believe that there is any translation error risk for the Thai patent application. The mother language for all of the researchers and Mr. Chantratree is Thai and that is the language that the Thai patent application was written in. However, it is not clear to me that Ms. Kamolchanok Punjad, the lawyer overseeing the patent application in Cambodia, is fluent in Khmer.

Inventor Analysis As illustrated on the chart below, the four inventors are highly educated and have an average of 13 years of relative experience in researching cement technology. Two of the inventors have 19 years of relevant experience. Further, the expertise of the four inventors complement each other well as they collectively have an expertise in materials science, composite materials, civil engineering and chemical engineering.

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Inventor Analysis

Inventor	Expertise	Highest Education	Year of Relevant Experience	Number of Patents	Number of Papers
Wilasinee Hanpongpun	Ceramics Technology	Master's Science - Materials Science	7	3	0
Surachai Vangrattanachai	Clinker Technology	Master's Science - Composite Materials	19	3	1
Bunpote Matrajumroonkul	Prestressed Concrete	PhD. - Civil Engineering	8	3	2
Chalermwut Snguanyat	Chemical Engineering	Master's Science - Chemical Engineering	19	6	3
Average Years of Experience			**13**		

Inventor-Patent Attorney Interaction Analysis I believe that there is no risk of communications problems between the inventors and the patent attorney. As discussed above, there are no translation error risks as discussions between the inventors and the patent lawyer were conducted in Thai. Official interaction between the inventors and the patent lawyers was one hour for an IP Committee meeting, as well as more than three other meetings in which the drafting of the patent was discussed. However, Mr. Chantratree works closely with the SRI researchers on a daily basis in Saraburi.

Patent Lawyer Analysis Mr. Sukhum Chantratree, an Intellectual Property Specialist at SRI, drafted the patent applications and will direct the prosecution of the patents. Mr. Chantratree earned a B. ENG in Mechanical Engineering and a M. Eng in Industrial Engineering. He has eight years' experience drafting patents and has drafted 10 cement related patent applications. Mr. Chantratree is assisted by SCG Legal, which has many lawyers familiar with patent law.

Overseeing the patent application in Cambodia is Ms. Kamolchanok Punjad, a patent executive at Rouse Thailand. She works in the Patents Team and has been with Rouse's Patent Group since 2010. Her main responsibilities are correspondence to clients and foreign associates, and assisting attorneys in document preparations. Ms. Punjad earned both her BA and LL.B from Chulalongkorn University in Bangkok, Thailand. While I could not find biographical information about Ms. Punjad beyond what is written here, it

is impressive that she is employed by Rouse, one of the largest western intellectual property law firms with offices in Bangkok.

Patent Examiner Analysis It is not yet determined who the examiners of the subject patent applications will be. However, SCG has elected to submit its patent application to a Thai examiner rather than choose an alternative examination track whereby the examination would be outsourced to a non-Thai patent examiner. In so doing, SCG ensures that there will be no language or translational issues in the review of its patent application in Thailand. Also, the local examination route may facilitate more examiner interviews, if that becomes desirable during prosecution.

Internal Valuation Analysis It is the policy of SRI to patent its best inventions rather than to protect them as trade secrets. SRI's patent screening is rigorous and its patent quality is high as SRI is cautious about filing patents. There is no pressure on the part of SRI's management or researchers to file unnecessary patents due to ego or compensation. While researchers could earn bonuses of Bt. 10,000 for their patent filings, this is not sufficient incentive to cause them to file unnecessary patents, in part, because of the long pendency period in Thailand.

SRI has invested two months to the drafting, searching and filing of the subject patent applications at a cost of some Bt. 140,000 (Bt. 80,000 for Thailand and Bt. 60,000 for Cambodia) as well as Bt. 10,000 worth of SCG Legal's time in terms of prosecutory work. The investment in the subject patent applications exceeds the Bt. 60,000 that was spent on prosecuting the other 10 patent applications that Mr. Chantratree filed. While all of the other 10 patent applications were only filed in Thailand, the subject patent applications were filed in both Thailand and Cambodia.

Patent Family Analysis The subject patent applications will only be filed in Thailand and Cambodia. According to my discussions with Mr. Chantratree, there are no plans to file continuation patent applications at this time. Thus, the small size of the patent family warrants no portfolio premium.

CONCLUSION OF PATENT VALUATION

The standard practice in the valuation profession is to present Conclusions of Value as of a specified date based on what is known or knowable. I do not believe the patent application in Cambodia has any value at this time. For the application in Thailand, the Cost Method suggests that Bt. 17.3 million is a reasonable valuation; the Market Method indicates a valuation of Bt. 38.3 million while the Income Method produces a valuation of Bt. 28.5 million. I weighted the valuation resulting from the Income Method most heavily because I believe that there is a relatively high degree of visibility into the cement industry. While applying three permutations of the Market Method and generating results in a tight range gave me comfort, I could find no truly compelling comparables. The Cost Method was of utility because it set a reasonable floor on the valuation.

I am not assigning any patent portfolio premium to the combined valuation of the two subject patent applications as there are not enough patent applications or children patents to award a patent portfolio premium. Thus, my Conclusion of Fair Valuation for the two PCC patent applications is Bt. 29.9 million as of October 2, 2014.

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Summary of Conclusions of Value

PCC Patent Application (Thailand)	Calculated Value	Rounded Value	Instant Weighting	Methodology Weighting
Methodology				
Cost Method	**฿17,294,248**	**฿17,300,000**		**1**
Market Method	**฿38,257,692**	**฿38,300,000**		**2**
The Saraburi Acquisition Comparable	฿41,418,457	฿41,400,000	1	
Eastern European Comparables	฿38,477,311	฿38,500,000	1	
Cambodia Cement Chakrey Ting Factory Comparable	฿34,877,307	฿34,900,000	1	
Income Method	**฿28,524,786**	**฿28,500,000**		**3**
Conclusion of Value of PCC Patent Application (Thailand)	**฿29,897,331**	**฿29,900,000**		
Conclusion of Value of PCC Patent Application (Cambodia)	**฿0**	**฿0**		
Conclusion of Value of PCC Patent Applications (Thailand and Cambodia)	**฿29,897,331**	**฿29,900,000**		

EXHIBIT A

DESCRIPTIONS OF COMPARABLE CEMENT PRODUCERS

Artgo Mining Holdings Ltd

ArtGo Mining Holdings Ltd. engages in the mining investment, extraction, processing, sale and installation of stone material. The Company's major products consist of marble, including white jade series, Van Gogh series, ABBA grey series, violet series and polar white series.

Asia Cement China Holdings Corp

Asia Cement (China) Holdings Corporation is an investment holding company. The Company's principal business activities are manufacture and sales of cement, concrete and related products. The products of the Company are classified into four principal categories: cement products, clinker, ready-mixed concrete (RMC) and blast-furnace slag powder. Its sales network spans across Jiangxi, Hubei, Sichuan, Yangzhou, Shanghai, Zhejiang, Fujian and Hunan. The Company's cement and RMC products are sold in the province of Jiangxi, Hubei, Sichuan, Zhejiang, Anhui and Fujian, and in Shanghai municipality under the brand name Skyscraper. As of December 31, 2011, the Company's investment holding subsidiaries included Perfect Industrial Holdings Pte. Ltd., Oriental Industrial Holdings Pte., Ltd., Asia Continent Investment Holdings Pte., Ltd. and others. On July 31, 2014, the Company announced the complete the acquisition of Sichuan Lanfeng.

China National Building Material Co Ltd

China National Building Material Company Limited is an investment holding company. The Company operates in five segments: Lightweight building materials, which is engaged in production and sale of lightweight building materials; Cement, which is engaged in production and sale of cement; Engineering services, which is engaged in provision of engineering services to glass and cement manufacturers and equipment procurement; Glass fiber and composite materials, which is engaged in production and sale of glass fiber and composite materials, and Others, which is engaged in merchandise trading business and others. As of December 31, 2011, its subsidiaries included Shanghai Yaohua Pilkington Glass Company Limited, Jushi Group Company Limited, Nanfang Wannianqing Cement Company Limited, Hubei Daye Jianfeng Cement Company Limited and others. On 31 October 2011, it fully acquired Dalian Jingang Tianma Cement Company Limited., Simao Jianfeng Cement Company Limitedand and other subsidiaries.

China Rare Earth Holdings Ltd

China Rare Earth Holdings Limited is an investment holding company. The Company, along with its subsidiaries, is engaged in the manufacture and sale of rare earth products and refractory products. It operates in two segments. The rare earth segment is engaged in the manufacture and sale of rare earth products, including fluorescent products. The refractory segment is engaged in the manufacture and sale of refractory products, including high-temperature ceramics products and magnesium grains. On 12 August, 2011, a subsidiary of the Company, Yixing Xinwei Leeshing Rare Earth Company Limited disposed of its entire interest in Jianghua Yao Nationality Autonomous County Xinghua Rare Earth

Company Limited. As a result of this disposal, the rare earth business of the Company was discontinued.

China Resources Cement Holdings Ltd

China Resources Cement Holdings Limited is an investment holding company. The Company's subsidiaries are principally engaged in the production and sale of cement, concrete and related products and services. The Company operates in two segments: Cement and Concrete. The Cement segment is engaged in manufacture and sale of cement and related products. The Concrete segment is engaged in manufacture and sale of concrete and related products. The Company's operations range from the excavation of limestone to the production, sale and distribution of cement, clinker and concrete. Its products are primarily used in the construction of infrastructure projects, such as hydroelectric power stations, dams, ports, bridges, airports and roads, suburban development and high-rise buildings.

China Shanshui Cement Group Ltd

China Shanshui Cement Group Limited is engaged in manufacturing and sale of cement and clinker, and limestone mining. The Company is engaged in the production and sales of various types of cements, and the production of commodity clinker necessary for various types of high grade cements in Shandong and Liaoning Provinces. The commodity clinker produced by the Company is mainly sold to clients with cement grinding station. The cement produced by the Company under the brand of Shanshui Dongyue is widely used in construction works for roads, bridges, housing and various types of construction projects. The Company operates in three geographical areas: Shandong Province, Northeastern China and Shanxi Province. During the year ended December 31, 2011, the Company acquired Inner Mongolia Lande Cement Co., Ltd., Zhalaite Qi Shanshui Cement Co., Ltd., Huixian Luqiao Cement Co., Ltd., Dezhou Tianqi Concrete Co., Ltd. and others.

China Tianrui Group Cement Co Ltd

China Tianrui Group Cement Company Limited, along with its subsidiaries, is engaged in the extraction of raw materials from mines, as well as manufacturing, sale and export of cement, clinker, flyash powder, slag powder, concrete and other cement products. Its subsidiaries include Zhong Yuan Cement Company Limited, China Tianrui (Hong Kong) Company Limited, Tianrui Group Cement Company Limited, Lushan Xian Antai Cement Company Limited, Tianrui Group Ruzhou Cement Company Limited, Shangqiu Tianrui Cement Company Limited and others.

Summit Ascent Holdings Ltd

Summit Ascent Holdings Limited is an investment holding company. The Company, along with its subsidiaries, is engaged tiles trading and engineering operations. On May 16, 2011, the Company changed its name to Summit Ascent Holdings Limited from Arnhold Holdings Limited. On February 22, 2011, the Company completed the disposal of its wholly owned subsidiary, Arnhold (B.V.I.) Limited. Since then it discontinues trading, manufacturing and export, and retail and renovation business including bathrooms trading, marble and bathroom products manufacturing and export, and bathroom products

retail and renovation operations.

TCC International Holdings Ltd

TCC International Holdings Limited, together with its subsidiaries, is engaged in import and distribution of cement in Hong Kong, and manufacture and distribution of cement, clinker and slag powder. It is also engaged in production and distribution of ready-mixed concrete in Hong Kong. Its segments include import, distribution and handling of cement, which imports, distributes and handles cement in Hong Kong; manufactures and distributes of cement, clinker and slag powder, which manufactures and distributes cement, clinker and slag powder in the People's Republic of China, and investment holding, which invests in listed and unlisted equity securities. Its subsidiaries include Anhui King Bridge Cement Ltd, Chiefolk Company Limited and others. In August 2013, Prosperity Minerals Holdings Ltd announced the disposal of its entire 16.11% equity interest in TCC Liaoning Cement Company Limited to TCC International Holdings Limited.

West China Cement Ltd.

West China Cement Limited, along with its subsidiaries, is engaged in the production and sale of cement in western China, the People's Republic of China (PRC). The Company has a presence in eastern and southern Shaanxi, and in Xinjiang Province. The Company has approximately 17 NSP cement production lines with total cement capacity standing at 21.1 million tons in Shaanxi Province, and an additional 2.6 million tons in Xinjiang Province. The Company's cement products are used in a variety of infrastructure projects such as highways, railways, bridges, hydroelectric power stations, water conservancy and water transfer projects. The Company also focuses on serving both the urban and rural development needs of western China, an area which is experiencing rapid urbanization and population resettlement, accompanied by housing and social infrastructure development.

EXHIBIT B

DESCRIPTION OF VARIOUS TYPES OF CEMENT

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Description of Various Types of Cement

Types of Cement	Composition	Purpose
Rapid Hardening Cement	Increased Lime content	Attains high strength in early days it is used in concrete where form work are removed at an early stage.
Quick Setting Cement	Small percentage of aluminium sulphate as an accelerator and reducing percentage of Gypsum with fine grinding	Used in works is to be completed in very short period and concreting in static and running water
Low Heat Cement	Manufactured by reducing tri-calcium aluminate	It is used in massive concrete construction like gravity dams
Sulphates Resisting Cement	It is prepared by maintaining the percentage of tricalcium aluminate below 6% which increases power against sulphates	It is used in construction exposed to severe sulphate action by water and soil in places like canals linings, culverts, retaining walls, siphons etc.,
Blast Furnace Slag Cement	It is obtained by grinding the clinkers with about 60% slag and resembles more or less in properties of Portland cement	It can used for works economic considerations is predominant.

Types of Cement	Composition	Purpose
High Alumina Cement	It is obtained by melting mixture of bauxite and lime and grinding with the clinker it is rapid hardening cement with initial and final setting time of about 3.5 and 5 hours respectively	It is used in works where concrete is subjected to high temperatures, frost, and acidic action.
White Cement	It is prepared from raw materials free from Iron oxide.	It is more costly and is used for architectural purposes such as pre-cast curtain wall and facing panels, terrazzo surface etc.,
Coloured Cement	It is produced by mixing mineral pigments with ordinary cement.	They are widely used for decorative works in floors
Pozzolanic Cement	It is prepared by grindin pozzolanic clinker with Portland cement	It is used in marine structures, sewage works, sewage works and for laying concrete under water such as bridges, piers, dams etc.,
Air Entraining Cement	It is produced by adding indigenous air entraining agents such as resins, glues, sodium salts of Sulphates etc during the grinding of clinker.	This type of cement is specially suited to improve the workability with smaller water cement ratio and to improve frost resistance of concrete.
Hydrographic Cement	It is prepared by mixing water repelling chemicals	This cement has high workability and strength.

EXHIBIT C

APPORTIONMENT CONSIDERATIONS

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Apportionment Considerations

• Management	• Switching Costs
• Workforce	• Restrictive Contracts
• Non-Compete Agreements	• Regulatory Approvals
• Quality of Investors	• Network Effects
• Brand Equity	• Trade Secrets
• Trademarks	• Economies of Scale
• Servicemarks	• Domain Name
• Customer Relationships	• Bottlenecks
• Data Exhaust	• Copyrights

EXHIBIT D

BLACK-SCHOLES FORMULA

Below is an abbreviated version of the Black-Scholes Model used to calculate the implied royalty rate (discussed on pages 68-70).

The Formula

$$RR = PR \times \frac{N(\sigma\sqrt{T}/2) - N(-\sigma\sqrt{T}/2)}{e^{rT} + [N(\sigma\sqrt{T}/2) - N(-\sigma\sqrt{T}/2)]}$$

Where:
RR is the Royalty Rate as a proportion of sales,
PR is the Profit Ratio or margin on sales,
N(·) is the Normal Distribution Function,
σ is the standard deviation of the market,
T is the life span of the patent, and
r is the Risk-free interest rate.

EXHIBIT E

PATENT MAINTENANCE FEES IN THAILAND

Siam Research and Innovation - PCC Patent Valuation
October 2, 2014
Schedule of Patent Maintenance Fees in Thailand

Items	Official Fees (THB)	Professional Fees (USD)
5th year	1,000	220
6th year	1,200	220
7th year	1,600	220
8th year	2,200	220
9th year	3,000	220
10th year	4,000	220
11th year	5,200	220
12th year	6,600	220
13th year	8,200	220
14th year	10,000	220
15th year	12,000	220
16th year	14,200	220
17th year	16,600	220
18th year	19,200	220
19th year	22,000	220
20th year	25,000	220

Source: http://www.pintas-ip.com/p/patent-thailand

EXHIBIT F

PATENT MAINTENANCE FEES IN CAMBODIA

Siam Research and Innovation - PCC Patent Valuation

October 2, 2014

Schedule of Patent Maintenance Fees in Cambodia

Year	Annual Maintenance Fees in
1	
2	
3	
4	
5	$120
6	$160
7	$200
8	$240
9	$280
10	$320
11	$370
12	$420
13	$470
14	$520
15	$570
16	$630
17	$690
18	$760
19	$830
20	$910

EXHIBIT G

PATENT ENFORCEMENT IN THAILAND

For a patent owner facing a potential infringement in Thailand, several enforcement options are available, ranging from informal enforcement measures to formal legal proceedings in court. Both criminal and civil infringement actions are available. Assuming that the infringer can be identified with certainty, the first recommended step is usually to send a formal letter notifying the violator of your patent rights, or a more strongly worded cease-and-desist letter.

Sending letters is a cheaper and less time-consuming avenue compared with launching a complaint with the Thai Intellectual Property and International Trade Court (IP & IT) or the police authorities right away. It is quite possible that the alleged infringer(s) may not be aware that there is a valid patent in Thailand, and in some cases, they may agree to cooperate in order to avoid a costly and time-consuming litigation. Generally, these types of preliminary letters are sent by a patent attorney or a law firm representing the patent owner, or by the patent owner itself.

If the infringer does not reply or fails to discontinue the alleged infringing activity, more formal enforcement means may be employed, including a court order to seize evidence of infringement, a preliminary injunction, and, ultimately, a complaint to the IP & IT Court.

Siam Research and Innovation - PCC Patent Valuation

October 2, 2014

Presentation of Experts and Witnesses at Patent Infringement Trials

SE Asian Country	Experts: Written Statement / Affidavit	Court-Appointed Experts	Inventors as Witnesses (possible / allowed)
Indonesia			X
Malaysia	X	X	inappropriate
Philippines	X	X	X
Thailand	X	X	X
Vietnam	X	X	X

Source: Enforcing and Litigating Patent Issues in China and Southeast Asia, Baker & McKenzie, October 1, 2013

Once the lawsuit begins, the IP & IT Court will settle the issues in dispute. Patent disputes are not heard by juries in Thailand but rather IP & IT judges who do not have specialized technical or scientific training or background. All parties in the suit will be given an opportunity to present their witnesses and evidence to the court. (Please see the Chart above.) A patent infringement action generally takes from 18 to 36 months from the submission of the pleadings to the time of the first-instance of judgment of the IP&IT

Court, but it is possible that the trial may be protracted owing to the complexity of the patent and the amount of evidence to be presented.[65] It is my understanding that there are no treble damages in Thailand.

[65] http://www.tilleke.com/resources/patent-litigation-thailand-know-your-rights-and-duties

EXHIBIT H

PATENT ENFORCEMENT IN CAMBODIA

Infringement Law on the Patents of Cambodia stipulates about infringement as follows:

- The patentee shall have the right to institute court proceedings against any person who infringes the patent by performing, without his agreement, any of the following acts:
    - Making, importing, offering for sale, selling and using product; (ii) Stocking such product for the purposes of offering for sale; selling or using; (iii) Using process; (iv) Doing any acts referred in Items (i) and (ii) in respect of a product obtained directly by means of the process;
    - or who performs acts which make it likely that infringement will occur.

The punishment for infringing patent laws in Cambodia are stipulated as:

- Articles 133-134 of Law on the Patent, Utility Model Certificates and Industrial Designs stipulate the punishment for infringement as follows:
    - Article 133: Any person who knowingly performs an act which constitutes an infringement shall be guilty of an offence punishable by a fine from five million Riels to twenty million Riels or by imprisonment from one year to five years, or by both. The maximum penalty for a repeated offense committed within five years from the date of previous conviction, shall be doubled in both of fine and imprisonment.
    - Article 134: Where a person is found guilty of an offense under this Law, the competent Court may order the seizure of which is deemed as state asset and destruction of the infringing goods and of any materials and implement the predominant use of which has been in the commission of the crime.

Note:

Cases of violation for patent infringement have never occurred in Cambodia so it is difficult to assess the level of ease or difficulty associated with obtaining injunctions against patent infringers in Cambodia.

Furthermore, the IP Law of Cambodia has not been completed yet and there are many changes in the future to help the IP system of Cambodia more integrate into the world IP architecture. Also, there have not been any documents issued to guide procedure for handling patent infringement in detail yet.

APPENDIX A

PATENT VALUATION GAUNTLET™ DISCLAIMER

1. As part of my analysis in preparing this Patent Valuation Report, I utilized the Patent Valuation Gauntlet™.

2. Information about the Patent Valuation Gauntlet™ is available here (www.patentvaluationgauntlet).

3. As of the date of this Patent Valuation Report, I was a Certified Patent Valuation Analyst in good standing. I lawfully obtained a license to use the Patent Valuation Gauntlet™.

4. While the Patent Valuation Gauntlet™ contains a wealth of issues to consider when preparing a Patent Valuation Report, the analyst is constrained by time and budget as to the number and detail with which such issues can be considered. The selection of issues contained in the Patent Valuation Gauntlet™ is left to the discretion of the analyst and will vary from one report to another and from one analyst to another. The relevance, interpretation and perspective of any of the issues contained in the Patent Valuation Gauntlet™ is subject to the judgment of the Certified Patent Valuation Analyst preparing the subject Patent Valuation Report.

5. No liability whatsoever for the use, non-use, completeness, or perceived misuse of the Patent Valuation Gauntlet™ is in any way assumed by the creators or promoters of the Patent Valuation Gauntlet™.

APPENDIX B

ASSUMPTIONS AND LIMITING CONDITIONS

1. Information, estimates, and opinions contained in this report are obtained from sources considered to be reliable. We have not independently verified every piece of data presented by management to us or that we located from external sources. We assume no liability for such sources.

2. Information supplied by management has been accepted as correct without further verification, and we express no opinion on that information.

3. Possession of this report, or copy or electronic version thereof, does not carry with it the right of publication of all or part of it, nor may it be used for any purpose by anyone but the client without the previous written consent of the client or us and, in any event, only with proper attribution.

4. We are not required to give testimony in court or be in attendance during any hearings or depositions, with reference to the patent application being valued.

5. The various estimates of value presented in this report apply to this valuation only and may not be used outside of the context presented herein. This valuation is valid only for the purposes specified herein as of October 2, 2014. Subsequent events have not been considered, and we have no obligation to update our report for such events and conditions.

6. This report was prepared under the direction of David Wanetick. Neither the professionals who worked on this engagement nor the partners of IncreMental Advantage, LLC have any present or contemplated future interest in The Siam Cement Public Company Limited or any interest that might prevent us from performing an unbiased valuation. Our compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.

APPENDIX C

CERTIFICATIONS

We certify that, to the best of our knowledge and belief:

1. The statements of fact in this report are true and correct.

2. The reported analyses, opinions, and conclusions are limited by the reported assumptions and limiting conditions. These limiting conditions include our inability to understand some information relative to The Siam Cement Public Company Limited that is only available in Thai. The statements made by management of The Siam Cement Public Company Limited in connection with the preparation of this report have not been independently verified. This Report is a presentation of my personal, unbiased professional analyses, opinions, and conclusions.

3. The analyses, opinions, and conclusions were developed, and this report was prepared in conformity with the teachings of the Certified Patent Valuation Analysts designation.

4. No one provided significant professional assistance to the person signing this report.

5. We had, do not have, and do not anticipate having any financial interest in The Siam Cement Public Company Limited.

APPENDIX D

SOURCES OF INFORMATION RELIED UPON IN THIS VALUATION

External Documents and Sources

1. In-person interviews in Bangkok, Thailand with the following executives and employees of The Siam Cement Public Company Limited:

    a. Dr. Prinya Sainamthip, Managing Director, Siam Research and Innovation
    b. Dr. Clarence Tang Chong Shin, Research Manager, Siam Research and Innovation
    c. Mr. Manasit Sarigaphuti, Research Manager, Siam Research and Innovation
    d. Mr. Sakprayut Sinthupinyo, Research Group Leader, Siam Research and Innovation
    e. Mr. Rojanakorn Guntapong, Central Laboratory Manager, Siam Research and Innovation
    f. Mr. Chayin Chinkomolsuk, Group Leader – Refractories, Siam Research and Innovation
    g. Mr. Sukhum Chantratree, Intellectual Property Specialist, Siam Research and Innovation
    h. Mrs. Patchalawilai Pongwishulada, Intellectual Property Specialist, Siam Research and Innovation
    i. Mr. Thutchai Puengsupa, Intellectual Property Specialist, Siam Research and Innovation
    j. Mr. Pongtawat Uttravorarat, Intellectual Property Specialist, SCG Chemical
    k. Mr. Wirot Phanitphotchamarn, Market Planning and Development Director, The Siam Cement
    l. Mr. Piyakorn Shinaratanakul, Marketing Communication Manager, The Siam Cement
    m. Mrs. Kwanpongsa Dacharux, Business Development Assistant Manager, The Siam Cement
    n. Mr. Surachai Vangrattanachai, Product Developer, Siam Research and Innovation
    o. Ms. Wilasinee Hanpongpun, Product Developer, Siam Research and Innovation
    p. Mrs. Maytinee Teabrat, Marketing Manager, The Siam Cement
    q. Mr. Anand Liraphirom, NPD & HVA Product and Service, The Siam Cement
    r. Ms. Sirintorn Inkrungkao, Assistant Manager – Costing Process – Accounting, The Siam Cement
    s. Mrs. Anusara Aranwattananon, Brand Communication Manager, The Siam Cement
    t. Mr. Piyakorn Shinaratanakul, Marketing Communication Manager, The Siam Cement
    u. Mrs. Kwanpongsa Dacharux, Business Development Assistant Manager, The Siam Cement
    v. Mr. Usacha Suksankraisorn, Assistant Manager – Corporate Security and IP, SCG Legal
    w. Maneerat Poonsinchusakul, Tax Lawyer, SCG Legal

2. Information provided by The Siam Cement Public Company Limited including:

    a. Introduction of SCG Siam Cement Group and Siam Research Innovation
    b. Press Release dated August 27, 2014
    c. Analysts Reports from Brokerage Firms
    d. Medium Term Plan – MSB Committee
    e. Financial Reports of The Siam Cement
    f. Thailand Infrastructure Report from Business Monitor International dated Q2 2014
    g. The Siam Cement Management's Discussion and Analysis
    h. The Siam Cement Auditor's Report
    i. The Siam Cement Annual Report to Shareholders 2013
    j. Relative Regulatory Report
    k. Technical Reviews of the Subject Technology
    l. Subject Patent Application
    m. Curricula Vitae of Inventors and Patent Lawyer

3. Cambodia's Curse: The Modern History of a Troubled Land by Joel Brinkley

4. The Rise of the New East: Business Strategies for Success in a World of Increasing Complexity by Ben Simpfendorfer

5. How Asia Works: Success and Failure in the World's Most Dynamic Region by Joe Studwell

6. KTMine Royalty Database

7. Internet and other sources as cited throughout this Valuation Report

8. Course materials used in the Certified Patent Valuation Analyst training program

APPENDIX E

CURRICULUM VITAE
DAVID WANETICK

Current Positions

IncreMental Advantage, LLC, Managing Director, Princeton, NJ Since 2005, David Wanetick has been a Managing Director at IncreMental Advantage, a valuation firm with an expertise in valuing intangible assets and emerging technologies. He is involved in all of the firm's valuation and business modeling. Clients include law firms; emerging, mid- and large-sized companies; technology transfer offices; inventors; venture capitalists and private equity firms. Valuations are primarily conducted in the context of negotiating licensing agreements, mergers and acquisitions and litigation support.

Business Model Validation Since 2009, David has been the CEO of Business Model Validation, a firm which develops and reviews sophisticated business models for purposes of raising capital and capital budget allocation.

Certified Patent Valuation Analyst Since 2008, David has developed the curriculum and has run dozens of the courses required for applicants to earn their designations as Certified Patent Valuation Analysts. He works closely with other CPVA board members in terms of updating the course materials and updating the related exam.

Patent Fairness Opinions Since 2011, David has begun formalizing and standardizing the preparation of patent fairness opinions that are used in a wide array of patent-related transactions all over the world.

Previous Positions

Earlier in his career, David was a securities research analyst and was employed by Merrill Lynch, First Albany and wrote his own newsletter, Market Maneuvers. David was the senior analyst for Gateway Memorandums / the Wall Street Transcript for five years.

Previous Valuations

Among the specific technologies, and related patents, and companies that David Wanetick valued are semiconductor equipment; optical inspection; micro electrical mechanical systems; keyboard, video, mouse patents; SIM card technologies; Internet applications; water separation technologies; water carbonation technologies; RF communication links; Internet traffic control technologies; payment processing technologies; Internet search applications; biometrics; electro-magnetic pulse inspection equipment; orthogonal frequency division multiplexing; robotic lawnmowers; immune system biologicals; Bluetooth applications; defibrillators; ocean thermal energy conversion technologies; oil services technologies; loyalty marketing technologies; catalytic heating; trademarks related to specialty apparel; wireless applications; software for schools; audio cables; glucose monitoring test strips; solar power patents; hydraulic fracturing; grain measurement devices; electrical current management; database software; food processing innovations and personal hygiene products.

Publications – Books

David is the author of three books that have achieved world-wide acclaim, including the only two books that unveil Industry Analysis. These books include Bound for Growth: How to Use Winning Stocks Using Industry Analysis (1997) and Hot Sector Investing: How to Profit from Over 100 Emerging Opportunities (1999). He developed a textbook for his course entitled Valuation of Emerging Technologies.

Publications – Articles

Some of the recent articles written by David Wanetick include:

- Valuation of Patent Applications with Binomial Distribution
- Patent Valuation and Baseball Players
- Costs of Capital - You Can Love More than Just One
- What is the Real Value in Real Options?
- Residual Knowledge Agreements and Neural Prosthetics
- Determining Patent Value Through Claims Analysis
- The Value of Valuing Patents
- How Patent Vulnerability Impacts Valuation
- Strategic Implications of Trade Secrets
- Opening the Kimono on Contract Valuation
- How Sun Tzu Would Outflank Patent Trolls
- The Value of Withheld Indemnifications
- Assessing the Probability of Obtaining a License
- Strategies for Negotiating Licenses
- Winning Negotiations Before They Begin

In addition to dozens of blogs that have published David Wanetick's work, his articles have appeared in:

- Les Nouvelles, published by the Licensing Executive Society
- Intellectual Asset Management
- Patent World
- CEO Magazine
- The CPA Journal
- Licensing Journal
- Willamette Insights
- Valuation Strategies

- Valuation Examiner
- Business Valuation Update
- IP Frontline
- IP Litigator
- Technology Transfer Tactics
- Inventor's Digest
- Private Equity Manager
- Research & Development Magazine
- The Canadian Institute of Chartered Business Valuators

Lecturing

David teaches the following courses through The Business Development Academy:

- Valuation of Emerging Technologies
- Negotiating License Agreements for Maximum Returns
- Financial Modeling and Projections
- Fundamentals of Business Valuation

These courses have been delivered all over the United States (New York City, Princeton, Philadelphia, Boston, Washington DC, Atlanta, Raleigh, Dallas, Miami, Austin, Chicago, Silicon Valley, San Francisco, Seattle, San Diego), in the United Kingdom, Belgium, Germany, Spain, the Netherlands, Singapore, Kuwait, Malaysia, India, China, Hong Kong and Israel. Attendees from all over the world have participated via webinar.

Representatives from more than 375 Fortune 500 companies have attended his programs. In addition, he has lectured on the above issues before many organizations and corporations such as the Houston Intellectual Property Lawyers Association; The Northeast Technology Council; The New York Society of Security Analysts; The Toronto Society of Security Analysts; The Montreal Society of Security Analysts; The San Francisco Financial Analysts Society; and, The Boeing Company.

From 1997 – 2004, David taught Industry Analysis at The New York Institute of Finance and at The New York Society of Securities Analysts.

Education

David received his undergraduate degree from Bucknell University in December 1988, where he double majored in economics and political science. He pursued a Masters of Science Degree in Taxation from Pace University from 1989 to 1990.

Certifications

David Wanetick earned his standing as an Accredited Valuation Analyst with the National Association of Certified Valuation Analysts. He is a Certified Patent Valuation Analyst and a Certified Emerging Company Analyst.