

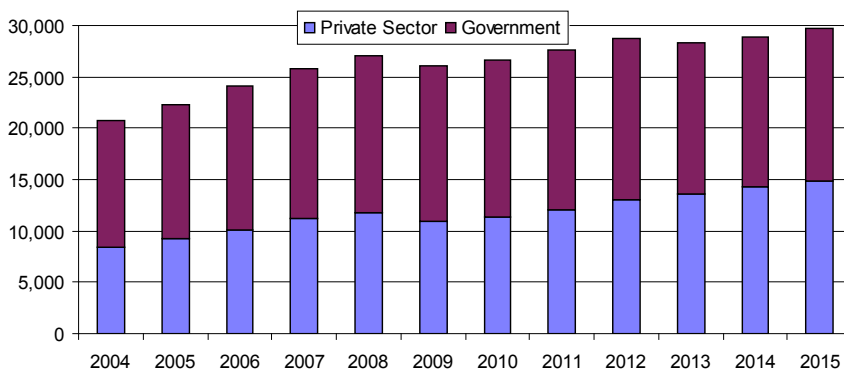
ENVIRONMENTAL C&E BUSINESS BOASTS STEADY GROWTH AND INVESTOR APPEAL

With 2015 winding down to an end it is understandable that environmental companies are looking forward to 2016, rather than looking back at 2015. Market dynamics are generally pointed in a positive direction and environmental companies are generally optimistic that 2016 will be better than 2015. Not that 2015 has been such a bad year. Most accounts point to growth in the U.S. environmental consulting and engineering (C&E) industry in 2015 being closer to 3% than the just under 2% growth rate that **Environmental Business International Inc.**, publisher of EBJ, concluded for 2014.

And while we at EBJ also like to look to the future, as analysts we steep ourselves in as much real data as possible to the effect that we are only publishing our full accounting of the U.S. environmental consulting and engineering industry in 2014 in this edition and its companion data sets. Revenue and/or 2014 revenue growth figures have been compiled for more than 600 U.S. C&E firms in EBI's model of the C&E industry, and forecasts are principally derived from reputable economic data, secondary environmental industry sources, as well as survey responses from more than 300 C&E firms throughout the year.

The U.S. environmental C&E industry grew 1.9% to \$28.87 billion in 2014, and EBI's current estimates have 2015 growth at 2.5-3%. Government markets declined 2% in 2014 and private sector markets increased 6%, continuing a recent trend: Private client markets have outpaced public sector client markets since 2009, and also throughout the previous five years from 2004-2008. (The chart at top right illustrates the share of C&E revenues derived from government going from 59% in

U.S. Environmental Consulting & Engineering Industry 2004-15



Source: Environmental Business International Inc., San Diego, CA, based primarily on annual surveys of C&E firms, units in \$mil. Share of revenues derived from government has gone from 59% in 2004 to 49% in 2014.

Revenue Performance of U.S. Environmental Consulting & Engineering Firms by Size in 2013-2014 (\$mil)

Size (Env'l C&E Revenues)	Firms 2013	Firms 2014	Net 2014 Env'l C&E	2013 Growth	2014 Growth
Big 5>1 bil	6	5	7,801	-9.1%	0.5%
Big 100m-1 bil	45	40	10,113	-1.7%	-1.3%
Mid 20-100 mil	135	139	4,980	3.9%	8.9%
S 10-20 mil	142	143	1,927	2.3%	3.0%
S 5-10 mil	187	189	1,333	8.6%	2.9%
S 1-5 mil	567	564	1,538	9.5%	3.1%
S <1 mil	2,154	2,122	1,178	7.8%	7.2%
Total	3,236	3,202	28,870	-1.5%	1.9%

Source: EBJ's annual model of the U.S. environmental consulting & engineering industry based on annual revenue surveys of C&E firms, interviews and reliable secondary data: Size categories are environmental revenues only.

Inside EBJ

C&E Overview: EBJ's overview and forecast for the \$29-billion U.S. environmental consulting & engineering industry shows 2-3% growth in 2014 and 2015, with private markets covering government decline; 3-4% growth expected in 20161-5

Regulatory Report: James Rubin of Dorsey & Whitney sizes up scenarios for EPA's Clean Power Plan, Waters of the US rules and the post-COP21 market8-9

Feature: Local governments take the lead on resilience and climate adaptation—or follow the lead of consultants like Kleinfelder, Arup, Stanley and others10-17

Profiles and Q&As: Weston recovers, regional players Northgate, Rincon Consultants and SGI lead the edge in development, remediation and water markets.....17-25

M&A Review: Private equity and strategic acquirors compete to make the industry's top deal lists in 2015. Advisory firms Morgan Joseph TriArtisan, EFCG, ROG+ Partners and BGL highlight key transactions and what they mean26-33

Executive Q&A: Anne Massey of Amec Foster Wheeler offers perspective on strategy, markets, the rebound in government business and CCR work ahead.....34-38

2004 to 49% in 2014.) Along with the decline in government markets is the decline in share for the largest firms, a more recent phenomenon. As the table on page 1 shows gross environmental C&E revenues in the 'Big 5' C&E firms declined 9% in 2013 and was flat in 2014.

For firms with large environmental practices of \$100 million to \$1 billion, the decline was 2% and 1% in 2013 and 2014, respectively, while the mid-sized C&E firm category showed a 9% gain in 2014. Contributing to this large gain was the fact that five firms fell back into the mid-sized category by posting less than \$100 million in gross revenue in their environmental C&E business in 2014, while only one advanced into the \$100 million+ category. Comparing the same companies from the 2013 categories, mid-sized firms collectively grew but only 3%, while the large firms still declined. The largest casualties were Cardno, CB&I and Worley Parsons that each registered a more than \$100 million drop in their 2014 environmental revenues, largely the result of the downturn in the oil & gas and mining industries.

The table at the right exhibits the share of companies with more than \$100 million in environmental C&E revenues, a share that advanced steadily from 30% in 1990 to almost 70% in 2012 before falling back below 65%. Most have speculated that the share of large firms would inexorably grow larger, so the leveling was somewhat of a surprise—along with the global financial crisis, the collapse in oil prices and commodity prices that were largely responsible for the hit on the largest players.

Another long-term trend that has reversed itself or slowed recently is the growing contribution of international revenues to the U.S. environmental consulting and engineering industry. In 1994 U.S. environmental C&E firms derived 6% of their revenues outside the USA and that figure has hit 19% today, but that share has pretty much leveled the past two years. The share also leveled from 2002-2007 as strong growth in domestic markets drew investment from overseas initiatives. With the U.S. economy stronger than much of the world into 2016, this new trend will likely continue, but not for long.

Revenue Performance of U.S. Environmental C&E Firms

	2009	2010	2011	2012	2013	2014
Flat	11%	8%	7%	7%	9%	8%
Growth	32%	63%	54%	61%	61%	63%
Decline	58%	29%	39%	32%	31%	30%

Source: EBJ's database of C&E firms; 600-700 firms each year with revenues or percentage growth reported in 2008-2014

Consolidation of U.S. C&E Industry 1990-2014

	Firms \$100m+	Gross Revs \$mil	C&E ind \$bil	Gross Rev Tot	% of Total Gross Rev	Avg Rev of 100m+
1990	23	4,190	12.5	14.0	29.8%	182
1994	32	7,447	15.31	17.2	43.3%	233
1998	28	8,476	15.8	17.7	47.8%	303
2000	27	9,626	17.4	19.6	49.2%	357
2001	30	11,212	18.4	20.6	54.3%	374
2002	28	11,871	18.8	21.1	56.3%	424
2003	33	11,541	19.5	21.9	52.8%	350
2004	38	12,722	20.7	23.2	54.7%	335
2005	38	13,896	22.4	25.1	55.3%	366
2006	43	15,358	24.1	27.1	56.7%	357
2007	45	17,354	25.9	29.1	59.7%	386
2008	48	19,915	27.1	30.4	65.5%	415
2009	44	18,157	26.0	28.1	64.7%	413
2010	45	19,438	26.6	30.2	64.4%	432
2011	45	20,307	27.6	31.5	64.4%	451
2012	52	23,274	28.8	33.6	69.2%	448
2013	50	21,496	28.3	32.8	65.6%	430
2014	46	21,528	28.9	33.5	64.3%	468

Source: Environmental Business Journal. Companies and revenues totals listed are for firms with more than \$100 million in gross revenues for environmental consulting & engineering. Based on annual surveys of C&E firms by EBJ and compiled revenue data derived from various sources including ENR, ZweigWhite and public company data.

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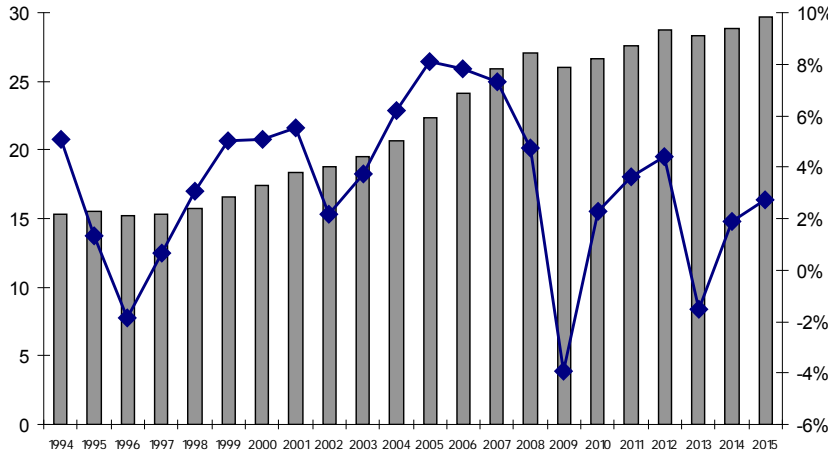
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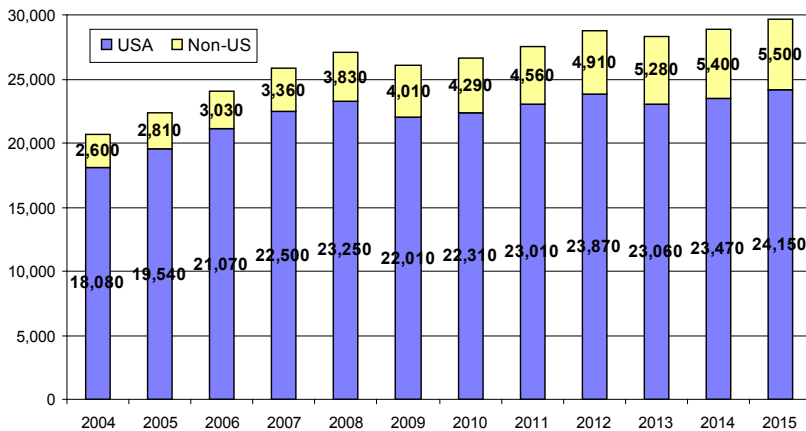
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Annual Size and Growth of U.S. C&E Industry: 1994-2015



Source: EBI, Inc. EBJ's annual C&E market models

Share of International Revenues Derived by U.S. C&E Firms



Source: EBI, Inc. EBJ's annual C&E market model derived from compiled geographic revenue breakdowns

Share of Top 10 U.S. Environmental C&E Firms, 1995-2014

	1995	2000	2005	2010	2011	2012	2013	2014
AECOM	-	355	778	1,768	2,230	2,281	2,128	3,328
CH2M	30	1,383	1,880	2,200	2,399	2,465	2,326	2,147
Tetra Tech Inc.	109	466	930	1,414	1,406	1,667	1,322	1,605
ARCADIS NV	129	154	450	1,143	1,136	1,086	1,031	1,332
Golder Assoc.	80	133	363	798	925	1,168	1,174	986
ERM	226	309	487	655	771	905	941	940
Total C&E	15,490	17,420	22,350	26,600	27,570	28,780	28,340	28,610
Big 6	574	2,800	4,888	7,978	8,867	9,571	8,922	10,338
Big 6 Share	4%	16%	22%	30%	32%	33%	31%	36%
Big 10	2,219	4,213	7,388	10,962	12,438	13,204	12,641	14,018
Big 10 Share	14%	24%	33%	41%	45%	46%	45%	49%

Source: EBJ database of C&E firms: Second 4 are Stantec, Battelle, MWH, Jacobs. Note: ARCADIS figures in 2014 are global environmental practice figures, where previous years was just the ARCADIS US figures. Also 2014 figures for AECOM include the merged business of URS, a previous member of the top 6 list, only in 2014.

The U.S. C&E industry will continue to attract investment and acquisition from foreign players, however, with 2015 examples including **Ramboll** acquiring **ENVIRON**, **Atkins** acquiring assets of **EnergySolutions** and **Intertek's** acquisition of **PSI** joining **Arcadis**, **Stantec**, **Cardno**, **AMEC**, **ERM**, **GHD** and other non-US acquirors of C&E firms of the past. U.S. firms are also buying significant overseas C&E assets with **Tetra Tech's** recent acquisition of **Coffey** and **Jacobs** 2013 acquisition of **SKM** as examples. (See discussion of M&A trends on pages 26-33).

Private equity capital continues to play a more influential role in the industry's evolution, fueling both the consolidation and globalization of the business. Notable private equity transactions in C&E in 2015 include **Apollo Global Management's** investment in **CH2M**, **Ontario Municipal Employees Retirement System's** investment in **ERM** (ERM is now on its fourth PE investor), and **Levine Leichtman's** investment in **Trinity Consultants** (now on its third PE partner), and a number of smaller transactions that don't always make the news.

Part of the appeal is financial and bringing financial tools to the table, but investors are also drawn to structural issues in environmental services segments such as fragmentation and under-capitalization. Investors also realize that growth is not entirely dependent on regulations.

On the larger C&E deals, Stephen Clarke, managing director at investment banking firm **Morgan Joseph TriArtisan LLC** said "given the attractive operating margins, low capital expenditure requirements and steady earnings streams of both ERM and Trinity, their private equity buyers were able to use substantial leverage to make these acquisitions."

Across the broader environmental services segments, "investors see safety in recurring revenue and high free cash flow conversion characteristics of many business models," says Effram Kaplan of investment banker **Brown Gibbons Lang & Company**. In addition,

Average Annual Growth in Environmental Services Firms

	2010	2011	2012	2013	2014	2015e	2016e
Dec 2015 Survey	3.2%	3.7%	2.3%	3.3%	3.3%	4.8%	6.3%
Jan 2015 Survey	4.6%	4.1%	3.9%	4.4%	3.9%	7.4%	8.3%
2014 Survey	3.3%	4.1%	5.5%	3.5%	5.2%	6.1%	
2013 Survey	3.7%	4.3%	4.7%	7.1%	8.1%		
EBI C&E Market	2.3%	3.6%	4.4%	-1.5%	1.9%	2.7%	3.6%

Source: Environmental Business Journal 2013-15 'Snapshot' or 'Census' surveys. Respondents include consulting & engineering, remediation contracting, hazardous waste management, environmental testing or other firms with C&E respondents the majority. Figures are mean growth or forecast for their company.

Ranking of Environmental Industry Client Sectors in 2013-16

	2013 Rank	2014 Rank	2015 Rank	2016 Rank	Change
Renewable energy development	3	4	2	1	2
Power utilities	5	7	5	2	4
Healthcare	2	3	1	3	-1
Chemical	9	5	3	4	2
Water utilities	8	8	4	5	2
Other manufacturing	21	15	21	6	13
Transpo.mfg (auto & aero)	17	21	8	7	8
Property developers: com'l	19	14	9	8	6
Banks & Law Firms	22	22	18	9	12
Solid waste utilities & cos	16	9	17	10	4
Electronics/computer mfg	14	20	7	11	3
Local government	28	23	20	12	12
Transportation authorities	17	16	13	13	2
Education	na	13	6	14	-5
Metals fabricating/coating	24	26	24	15	10
Food & beverage	11	11	14	16	-4
Hospitality	13	12	11	17	-5
Property developers: res'l	18	17	15	18	-1
State government	27	28	22	19	7
Consumer products	20	18	16	20	-2
Port authorities	12	10	12	21	-10
Federal government: DOD	32	33	25	22	8
Primary metals	10	25	23	23	-4
Federal government: DOE	30	30	30	24	6
Federal government: EPA	26	32	28	25	4
Major retailers	25	19	26	26	-3
Federal government: Other	29	31	29	27	3
Mining	7	24	32	28	-7
O&G Downstream (refineries)	6	6	19	29	-19
O&G Midstream (pipe/term)	1	2	10	30	-26
Pulp & paper	31	29	33	31	0
Petroleum retail/gas stations	23	27	31	32	-5
Oil & Gas Upstream (E&P)	1	1	27	33	-23

Source: Environmental Business Journal 'Snapshot' or 'Census' Surveys 2013-2015: Question was: Rate the customer areas in terms of prospects for growth. Respondents were given 7 response options from 'very strong growth' to 'big decline'. Change is a function of the average rank from 2013-2015 minus the 2016 rank.

“the highly fragmented nature of the sector supports private equity buy-and-build strategies which enhance value creation.... [and] deal activity is supported by a robust middle market lending environment.”

Andrej Avelini, managing director of **Environmental Financial Consulting Group** (EFCG) notes that PE firms also bring more financial muscle that can make companies more competitive in their markets, and with their shareholder employees. “One of the benefits of PE ownership is the professional capital which provides liquidity for shareholders at fair market value, and growth capital for acquisitions and working capital needs. Further, if the business plan and leadership is supported, PEs have the capital to strengthen the balance sheet, which may help manage the increasing risks that firms appear to be taking on projects.”

2015 INDICATORS

EBI expects C&E growth in 2015 to be near 3% and forecasts 3-4% for 2016-2017. Like EBJ surveys conducted in late 2015, EFCG surveys indicate CEOs expect internal growth to be a point higher in 2015 than 2014, and the forecast for 2016 growth another point or more higher (see page 6 for a discussion of EFCG results). EBJ kicked off its 2016 census by launching an December 2015 'Interim Census Survey' to gauge initial returns on 2015 and an updated forecast for 2016. With just under a hundred respondents, 67% reported revenue gain in 2015, 21% a decline and 12% reported 'flat', or -1% to 1% growth. This split compares favorably to historical proportions of 60-63% growing firms from EBJ's database of C&E firms as portrayed on the table on page 2. It must be noted the latter figures represent all firms, and not just a self-selected group of survey respondents that tend to be better performing. Mean growth for responding firms in 2015 was 4.8% and the 2016 forecast is 6.3%, down from the 7.4% expected in 2015 at the outset of 2015, but within the norm of 6-8% next-year average growth company forecasts by EBJ respondents in the past.

Considerably more movement shows up in the yearly client forecast as portrayed on the table at the left. Renewable energy

developers, power utilities healthcare and chemical manufacturers are the top-rated client categories for growth prospects in 2016, according to EBJ respondents. Several categories moved up the charts, including manufacturing, financial institutions, and local government. Federal agencies remain mired in the bottom half, but each showed some advance, notably DOD. Oil & gas dominate the bottom of the list, and not many expect much growth there even with sustained levels of domestic production fueling midstream and downstream markets.

KEY GROWTH FACTORS FOR 2016

Oil and gas prices are two key factors that impact current growth and forecast scenarios in environmental C&E (see table in EBJ V28N9), and these are both expected to not show much upward movement from their current lows for some time (see Industry Outlook on p. 21-22). Economists forecast U.S. GDP growth at 2.4-2.6% and global GDP at 2.6-3% in 2016, so not much of a charge to the environmental industry is expected from a rising tides of economies.

Development, property values and construction activity bears more promise, but must be proven to be sustained more by longer term fundamentals than recovery from the recession, and here employment and wages moving in a positive direction will support residential and commercial construction. Industrial activity has been moving in the right direction and indicators are U.S. manufacturing will improve in 2016, albeit modestly. Financial markets for the environmental industry lead by corporate M&A, corporate liability management and to a lesser extent by stock and bond markets seem structured to maximize the odds of some longer term stability, so demand is expected to be fairly reliable there.

Government spending is stabilizing in number of federal agencies report contractors, but the general direction continues more toward austerity than abundance. While historians may assert that presidents on their 'lame duck' year will wind down programs and focus on legacy, the Obama Administration is pressing ahead with a progressive environmental agenda. This ambitious agenda includes not only the broad, sweeping commitments made at the Paris Accord by the U.S. and 154 nations in December 2015, but more short-term prescriptive regulations spelled out in EPA's Clean Power Plan, in the Waters of the U.S. program (see review on page 8-9), and a growing emphasis on resilient infrastructure in the 2015 transportation bill. Resilient infrastructure is a key factor for not only the environmental industry in 2016-2017, but for mankind for the foreseeable future—or 2100 whichever comes first. Where the environmental industry once assured the public safety and kept companies and agencies out of trouble, its mission in the 21st century is increasingly assuring the smooth operating of the global economy. Now there's something to look forward to. ■

Source: Environmental Business International Inc. (San Diego, CA), Environmental Business Journal & EBI Report 726. Figures in EBJ's list of top ranked C&E firms are revenues generated for calendar year 2014 in gross environmental consulting & engineering (C&E) not including construction and remediation construction, but including project management/construction management. Environmental construction (air, waste, water), remediation construction and federal waste management or contracting services are counted in the middle column labeled Env'l Cont/HW. This list is a result of independent research and EBI surveys. In some cases, revenues are approximations derived from executives, analysts and reputable business information sources and published materials. Although EBI has made every reasonable effort to be accurate, figures are not the result of internal or external audits and are not guaranteed to be accurate. Errors and omissions are unintentional.

<i>Top U.S. Environmental C&E Firms in 2014</i>	Gross Revenues	Env'l Cont/HW	Env'l C&E
AECOM	19,575	1,383	3,328
CH2M	6,135	1,657	2,147
Tetra Tech Inc.	2,420	694	1,605
ARCADIS NV	3,951	90	1,332
Golder Associates	1,191	50	986
ERM	940	-	940
Stantec Consulting	2,284	-	754
MWH Global	1,310	540	704
Battelle Memorial Inst	4,770	-	685
Jacobs Engineering	12,695	430	597
CDM Smith	1,254	461	505
GHD	1,100	-	427
Ramboll ENVIRON	1,635	-	425
Parsons	3,432	242	410
ICF International	1,050	-	399
Black & Veatch Corp.	3,071	572	380
HDR Inc.	1,887	470	379
Amec Foster Wheeler	6,542	703	344
Brown and Caldwell	335	-	335
Louis Berger	907	80	317
Cardno Ltd.	1,204	20	305
Leidos (fmr SAIC)	5,008	-	301
Bechtel Group Inc.	35,283	2,558	265
WSP PB	3,714	-	260
Fluor Corp.	21,063	1,024	240
Weston Solutions	316	65	221
GeoSyntec Consultants	250	-	220
Kleinfelder Inc.	380	-	216
Carollo Engineers	173	-	173
TRC Companies Inc.	516	104	169
Hazen and Sawyer	165	-	165
Woodard & Curran	166	-	156
O'Brien & Gere	185	10	144
Terracon Consultants	480	-	144
SCS Engineers	155	16	139
WorleyParsons	6,630	110	133
Michael Baker Corp.	586	-	129
Apex Environmental	127	-	127
Ecology & Environment	128	-	124
SNC-Lavalin Inc.	6,150	-	123
Hatch Mott MacDonald	544	-	120
Burns & McDonnell	2,539	67	110
EA ES&T	121	20	107
Huntington Ingalls	6,960	-	105
Haley & Aldrich Inc	146	-	102

EFCG SURVEY INDICATES GROWTH IS NORMALIZING, BUT LARGE FIRMS HAVE A LOT TO CONTEND WITH

Environmental Financial Consulting Group (EFCG) conducts a detailed annual CEO survey of environmental and infrastructure engineering/consulting companies every year in advance of its October CEO conference. Below is some of the 2015 results and comments by the EFCG team of founder Paul Zofnass, Andrej Avelini and Joe Smetona. EFCG offers financial and strategic advisory, benchmarking and valuation services, annual C-level executive conferences, internal ownership transition advice, and buy-side and sell-side M&A services.

EBJ: Your recent survey figures show median internal growth of 5% in 2014 and 6% in 2015, with a projection of 7.3% in 2016, and recent history shows growth estimates have been pretty accurate. So are we pretty confident that market is on an upswing, and market growth of one to two percentage points higher than 2015 is likely in 2016?

EFCG: It is certainly possible that internal revenue growth will be a couple of percentage points higher in 2016, but I wouldn't necessarily bet on it. While the market has been on an upswing since the Great Recession, we are now approaching historical norms for internal growth (20 year average is 6.9%). I would also point out that firms tend to over-project growth for the following year by 1.4% on average (same year estimates tend to be very accurate), which is essentially the difference between the 2015 estimate (6%), and the 2016 projection (7.3%).

EBJ: Your survey also shows that while growth hit, profits on average fell short of expectations in 2014 and 2015. Was this likely a factor of billing rates or what other factors have pinched profitability rates in what has generally been a steady climb?

EFCG: Rates may have something to do with it, but we have been hearing complaints about

the commoditization of services for a long time. (See next question below for some challenges that we believe hurt large firm growth, and may also have contributed to lower profitability levels across the board)

EBJ: EFCG survey figures show 'weighted average growth' of 0% in 2014 and -2% in 2015, meaning large firms have been having trouble with growth. We know the federal market is a significant factor, but what other reasons are causing larger firms to have lower internal growth rates?

EFCG: 1) Many of the large firms (> \$1 billion in gross revenues) were negatively impacted by the decline in the commodities markets, which began in late 2014, and has continued through 2015. 2) A

number of large firms suffered significant losses on design / build contracts, which in some cases led them to exit certain businesses. 3) Large firms tend to be global and exposed to many parts of the world that are struggling (Europe, Australia, South America, etc.) 4) In general, large firms have been more focused on acquisitive growth, rather than organic growth, and have been busy integrating acquisitions they made last year. While these acquisitions may ultimately provide revenue synergies, the immediate impact is often negative, given the time and effort required to successfully integrate.

EBJ: And besides acquisitions, what are they doing about low internal growth?

EFCG: In our view, acquisitions have been the main antidote to low internal growth, which is one of the key challenges large firms are dealing with right now. Some large firms may be looking to enter new markets and geographies, but that is typically easier to do via an acquisition.

EBJ: Comment on the cycles we have seen in both U.S. firms buying overseas, and foreign firms buying in the U.S. market. What does this say about the market or the global industry?

Engineering/Consulting Firm Internal Growth: Median vs. Weighted Average



Source: Annual surveys by Environmental Financial Consulting Group; Weighted average accounts for size of the respondent in annual revenues and therefore reflects more accurately the larger firms or the entire industry.

EFCG: We have seen an increase in cross-border transactions, as many firms, especially the large regional players, are trying to better serve their multi-national clients in order to compete with the largest global players. Many firms are also looking to diversify into new geographies and markets, given the significant swings that any given region or market can go through (e.g. current energy sector challenges).

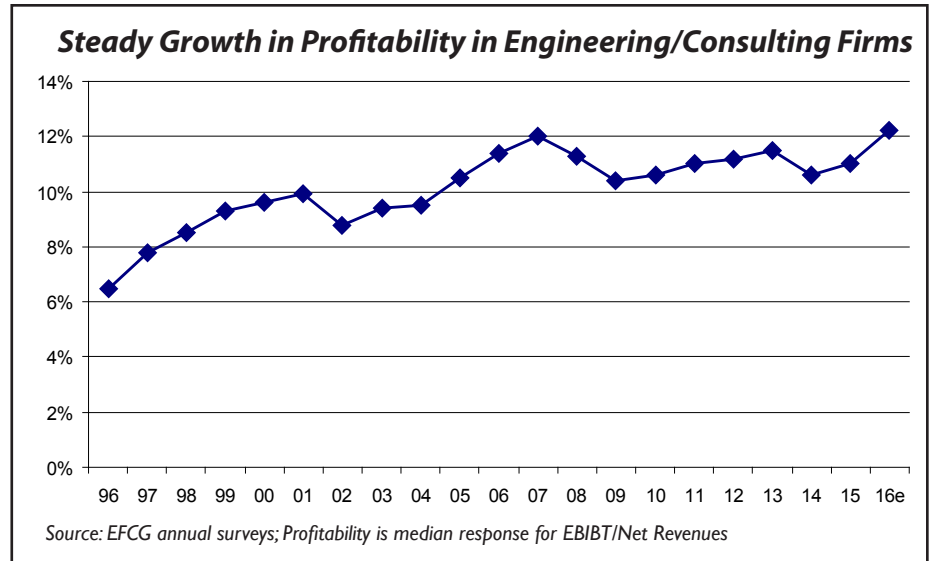
A recent example, which EFCG put together, was the acquisition of Environ, a ~\$300 million US environmental firm, by Ramboll, a ~\$1 billion Scandinavian infrastructure firm. Another example, which we also put together, was the merger between GHD, a ~\$1 billion Australian firm, and Conestoga Rovers & Associates, a ~\$500 million North American firm.

EBJ: Your 'best & worst' sector results are understandably not much different that our EBJ survey results and consistent with our theme of 'resilient infrastructure' as a driver for the rest of the decade and beyond, but with water/wastewater

and transport/infrastructure at the top of your list by some margin, how do we expect all the local governments and authorities to pay for all the work ahead? Any fundamental shifts in the long term ahead on how we finance, build and maintain infrastructure?

EFCG: The lack of government fund-

ing for infrastructure projects remains a salient concern, although it appears that the recent transportation bill that Congress passed a couple of weeks ago will help. It seems to us (or at least we hope) that there will be an increase in public private partnerships, or other alternative vehicles, to finance these projects. □



Beat & Worst Sector Outlook from EFCG Annual Surveys 2012-2015

	2015 Best	2015 Worst	2015 Rank	2014 Rank	2013 Rank	2012 Rank
Water/wastewater	57	-8	1	2	2	2
Transport/infrastructure	57	-15	2	4	5	9
Power	30	-1	3	3	3	4
Environmental	25	-7	4	6	4	5
Private customer	12	-2	5	7	7	10
Healthcare/pharma	10	-2	6	5	9	11
Air	8	-1	7	9	8	7
Res'l/land development	16	-10	8	17	18	21
Buildings	5	-1	9	18	19	18
P3	3	0	10	10	11	13
Design/Build	3	0	11	11	10	14
CM/PM	3	-1	12	12	13	17
Sustainability	4	-2	13	14	15	8
Remediation	6	-4	14	15	17	6
Construction	0	-3	15	13	16	12
Ind'l/com'l development	9	-13	16	8	6	3
Municipal	3	-8	17	19	20	20
Energy	30	-43	18	1	1	1
Federal	2	-25	19	20	21	19
Nat'l Resources/Mining	0	-25	20	16	12	15

Source: Environmental Financial Consulting Group, EFCG CEO Surveys 2012-15 in October, first 2 columns are # of votes submitted for each by approximately 220 companies participating. Last three columns are the rank based on a similar system in 2012-2014 surveys.

JAMES RUBIN SIZES UP CPP AND WOTUS SCENARIOS; LAUDS PARIS ACCORD

James W. Rubin is a partner at the international law firm Dorsey & Whitney. Before going into private practice, Mr. Rubin served for 15 years in the Environment and Natural Resources Division of the U.S. Department of Justice, where he was an assistant chief in the Law and Policy Section, a trial attorney in the Environmental Defense Section, and an agency representative to the White House Climate Change Task Force. He coordinated the division's international program and worked on a wide variety of domestic and international environmental policy and litigation matters, as well as trade and investment negotiations and disputes. Rubin says some controversial issues will face D.C. in 2016.

EBJ: What has been the vibe around Washington on the Obama Administration's environmental policy of late and the expectations for the 'lame duck' year?

James W. Rubin: Over the last several months, much critical attention has focused on EPA's Clean Power Plan, which seeks reductions of greenhouse gas (GHG) emissions from existing power plants, and the UN climate change negotiations in Paris where President Obama sought to play a leading role in structuring a new global agreement, in large part based on the Clean Power Plan. But beyond those efforts, the Administration has set forth a broad and ambitious schedule for 2016, the final year of the Obama Administration, issuing other key regulations impacting the power generation and other energy-related sectors.

These include other GHG-related rules on fuel, transportation, aviation, and oil and gas development, as well as revisions of major power sector air pollution rules on remand from the Supreme Court and D.C. Circuit.

Some of these rules will also be very controversial and likely to be challenged. Given all the work remaining on the Clean Power Plan as well as these other rules, it remains to be seen whether the relevant federal agencies can finish their work before a new administration enters the White House in January 2017.

EBJ: Some inside the beltway have said the CPP is DOA with all the suits from states and others lined up against it. What is the possibility of it surviving as is and what other scenarios do you see?

Rubin: The number of petitions filed against a rule may be a sign of the unpopularity of the rule, but it doesn't determine its merits. It only takes one suit to strike down a rule, and a dozen suits could all be unsuccessful. Notably, in the CPP, there are states and utilities on both sides of the case.

The real issue here is whether EPA has reasonably exercised its authority to issue the Clean Power Plan. EPA has certainly focused in its final rule on shoring up some of its greatest legal vulnerabilities, e.g. by allowing more time for compliance, establishing uniform performance standards and providing greater flexibility to states. But in the end, EPA will have to convince the D.C. Circuit, and potentially the Supreme Court, that it has the authority to do what it did and that it exercised that authority reasonably. Opponents have presented strong arguments against EPA, and it may very well come down to which judges are appointed to the review panel. Moreover, a final ruling on the merits could take several years, requiring states to plan for implementation without knowing if the rule will survive.

In order to avoid this, a number of states, utilities and other parties have moved the D.C. Circuit to stay the rule while the merits are pending. This motion will likely be decided in early 2016 and could have significant impact on the rule. A stay could stop much state planning which is now occurring and could signal trouble ahead on the merits for EPA. A denial would mean full steam ahead on state planning while the merits are litigated. Hence, the rule will face an early survival test in the first few months of 2016, but is

long-term chances for survival may not be clear for some time.

In recognition of this, nearly all states are undertaking some planning or discussions on how to implement the rule, even as they litigate. While this may be seen as hedging their bets, few states are now "just saying no," which would indicate that, at least beyond the beltway, rumors of the rule's imminent demise may be greatly exaggerated.

Overall, one could ask what would happen in a world without the CPP. In EPA's (and others') view, that world of cleaner power is already taking shape and dramatically re-shaping the power sector. It may then be a matter of time. A CPP scenario may propel the energy sector faster into a low carbon world but we may be heading there eventually.

EBJ: As the CPP is rolled out we assume power first than what industry sectors will be most impacted in terms of investments in new plants, fuel switching, decommissioning, etc.

Rubin: The rule specifically addresses existing fossil fuel-fired power plants, e.g. coal, gas and oil, and it will have the most immediate and greatest impacts on these sources. In particular, the rule is intended to further the switching from coal to natural gas for baseload generation. But it more broadly effects the entire power sector by incentivizing carbon-free power such as renewables, nuclear and even hydropower. Hence, it will impact investment in a number of generation types and fuels, as well as infrastructure to deliver and store such power (transmission, batteries), and pipelines to carry an expected increase in natural gas. And by further encouraging energy efficiency and reduced generation, it could have indirect impacts for all consumers of power.

EBJ: How much of a factor are state programs compared to federal mandates like the CPP? Have the role of states become more influential in clean power, renewables and APC over the last decade and do you see this continuing? How does CPP feed this?

Rubin: EPA wouldn't view the CPP as a federal mandate. Rather, EPA has set

guidelines and goals for states to follow and achieve to reduce carbon emissions from their existing fossil-fueled fleet. A federal plan only will apply to those states which choose to not issue their own plans or issue inadequate plans. Hence, the CPP is all about state plans so states do indeed have the biggest role to play in reducing emissions and energy demand.

In fact, EPA claims its rule is merely locking in and potentially speeding up transformations already undertaken by states, the power sector and the grid in moving to greater energy efficiency and cleaner power. EPA underscores that its rule is based on actions states and sources are already taking, e.g. renewable portfolio standards, demand side energy efficiency, even GHG regulations. EPA would no doubt assert that states, not the federal government, maintain the primary role, along with regional transmission and reliability organizations, in achieving a cleaner fuel economy.

EBJ: What do you see as the key accomplishments of COP21? What impact may these have on the demand for environmental services in the US and globally?

Rubin: As someone deeply involved in climate negotiations nearly two decades ago for the federal government, I cannot underestimate the significance of the 190-plus countries of the world all signing on to the Paris accord to take strong actions to reduce greenhouse gas emissions. In the Kyoto agreement, the world was still split between those who were the main emitters and those who were catching up but expected the former to take all the responsibility. That dichotomy doomed any chance of success.

Thus, I think the greatest accomplishment is the global recognition that addressing climate change is a shared and global responsibility, and that every country needs to take some actions to address the problem. It is also significant that the accord selects very aggressive goals for keeping below potentially catastrophic temperatures and balancing emissions and sinks by 2050.

What made this work is the concept of each country taking on its own obligations

rather than agreeing to top-down and potentially unachievable limits. But therein also lies the greatest weakness, since if countries do not meet their obligations, emissions will not be sufficiently reduced.

Environmental services should experience significant growth opportunities under the accord, not by the agreement itself, but in the green economies that must inevitably emerge if the provisions of the accord are to be reached through domestic actions and international cooperation. Countries will need to invest, mobilize and create new technologies, energy sources and infrastructure. Environmental services companies will have a role to play in all these efforts in countries undertaking obligations, and will play a role in transferring technologies from developed to developing countries. They may also play a role in developing and implementing the review, verification and reporting obligations each country has undertaken under the accord to show it is meeting its obligations.

EBJ: What policy measures do you foresee for climate adaptation or resilience... or is this mostly a local issue?

Rubin: Adaptation and resilience are indeed inherently local issues as climate change will have differential impacts on different communities. But marshaling financial and technological resources will be a role necessarily played by countries impacted by climate change, as well as by the developed countries that have agreed to take actions, including through financial assistance, to help the neediest countries adapt to and mitigate damages from climate change such as sea level rise, droughts, storms, disease, etc.

EBJ: What about the Waters of the US regulations. Do you see them as a key part of the Administration's last year and how do you think they will come out?

Rubin: The WOTUS rule is actually tangentially related to the CPP and climate change, since the increased infrastructure needed for a cleaner energy economy (e.g. new wind and solar installations, more transmission, new pipelines) will inevitably cross waterways and wetlands. The Administration has searched for ways to streamline permitting of this infrastructure, and

one goal of the WOTUS rule is to provide some certainty as to what is jurisdictional waters and what is not. The Administration does indeed view the long-awaited WOTUS rule as a key regulatory legacy, a way to try to balance development and environmental protections, and to provide some clarity and certainty in what has been a very confusing regulatory process.

Nevertheless, many regulated entities and states have raised concerns with the reach and scope of the jurisdiction asserted by EPA and the Corps under the rule, particularly in relation to streams and intermittent water courses. Such controversy has raged for a long time, resulting in several Supreme Court rulings and the regulatory quagmire EPA and the Corps were hoping to resolve.

The rule was broadly challenged and is currently stayed by the 6th circuit, indicating some juridical unease with the scope of the rule. It may very well be struck down and/or find its way again to the Supreme Court which has split on the issue as well. Ironically, while the litigation is pending and the rule is stayed, EPA and the Corps are regulating jurisdictional waters the same way they had been doing prior to the WOTUS rule, resulting in case-by-case determinations and lots of uncertainty. This will continue until the agencies can craft a rule that can survive judicial scrutiny and political controversy – assuming that can ever be done! □

A number of states, utilities and other parties have moved the D.C. Circuit to stay the [CPP] rule while the merits are pending.... A stay could stop much state planning which is now occurring and could signal trouble ahead on the merits for EPA. A denial would mean full steam ahead on state planning while the merits are litigated.

LOCAL GOVERNMENTS PUT ADAPTATION ON THEIR LONG TO-DO LISTS

“Resilience” is the word, as foundations, NGOs and federal agencies provide assistance and funding and new risk drivers for public and private property owners emerge

Mitigating risks and managing potential hazards are some of the most important functions of local governments and public infrastructure and resource managers. Climate change is already starting to amplify the weather-related risks and hazards they and their communities face, and the projected impacts over the coming decades are truly ominous.

But it's inherently difficult for elected and appointed officials to invest now to prepare for risks that are uncertain and years or decades away. Without an obvious benefit, most of their constituents would rather not pay more taxes or higher rates for big upgrades to their infrastructure or public amenities. And lacking federal money for infrastructure, local governments are already hard pressed to keep up with existing needs.

“A reality for most elected officials is that we live in a world that is highly reactive and not highly strategic,” said Linda Langston, a county supervisor of Linn County, Iowa, and chair of the **National Association of Counties’** Resilient Counties Initiative. “Getting local elected officials to look at climate change in a more strategic format is hard to do, but it's required.”

Local governments—often with help from consulting firms and NGOs—are finding ways to fund adaptation planning and measures. Changing federal and state policies and incentives are in some cases pushing local governments to incorporate climate impacts like sea level rise in planning, while new opportunities to price climate risk into private property valuation may be emerging.

In many cases, “climate change” is not highlighted in RFPs or new program announcements. Instead, the broader concept of resilience—one more read-

ily grasped by climate science skeptics—is being embraced by funders ranging from FEMA and HUD to the Rockefeller, Barr and Kresge foundations.

While the dictionary definition means “the capacity to recover quickly from difficulties,” most of the new investment in resilience is in planning, design and engineering that will allow communities to withstand and continue functioning during flooding, droughts and other extreme weather events.

Local governments—often with help from consulting firms and NGOs—are finding ways to fund adaptation planning and measures.

“If you want to maintain a shoreline neighborhood that's already flood prone and increasingly at risk from sea level rise, you can become more resilient through measures such as elevating homes, improving drainage and even elevating critical access roads,” said David Murphy, coastal resilience lead for consulting engineering firm **Milone & MacBroom**, which has performed coastal resilience studies for several New England communities.

A coastal risk resilience study for a small town is a small project, with fees ranging from \$25,000 to \$50,000, according to Murphy and others working in this niche. But the projects identified in such studies can be major—and the studies themselves give a community a leg up in getting FEMA, HUD or other grants for resilience projects. “If there's a budget in the planning phase [of a resilience study], we can do some concept-level design, and we can help the towns apply for grants,” said Murphy. “We've helped some of our

clients apply for FEMA grants or HUD CDBG grants for resilience projects, and some have been successful.”

STATE FUNDING SPARSE

Consulting engineering firm **Kleinfelder** has helped client communities in Massachusetts work through the state's Coastal Zone Management funding program, which offers “grants ranging from \$50,000 to \$70,000 for cities and town to do vulnerability and risk assessments followed by adaptation strategies,” said Indrani Ghosh, head of Kleinfelder's climate change group.

State funding for resilience and adaptation remains sparse, yet opportunities like Massachusetts' CZM grants can be found. In California, the state's fourth climate assessment included a \$4.5 million RFP for contractors to help build the capacity of local governments to plan for climate change impacts.

Consultants often volunteer a portion of their time to help with their government clients' grant applications. Ghosh told CCBJ that her firm has received fees and donated time to help clients respond to resilience grant RFPs—and they've assisted some in writing their clients' own RFPs for professional services to implement grant-funded projects. “Of course, these have to go through a public bidding process, but we have the advantage of being more familiar with what the RFP entails since we helped craft it,” said Ghosh.

This pro bono trend is reflected on a larger scale by the substantial donations of services that firms such as **Arcadis**, **AECOM**, **Arup** and **CH2M** are making to the C40 and Rockefeller 100 Resilient Cities initiatives. Arup's donation of services to C40 over the last three years comes to about \$1 million, for example. (See Arup profile following).

On the other side of the same coin, NGOs like The Nature Conservancy and Georgetown Climate Center and private foundations such as Kresge, Rockefeller and Barr, are stepping up with funding, technical assistance and help with initial planning that can position local governments to obtain state and federal funds.

FEDERAL CARROTS AND STICKS

Beyond the realm of government spending, consultants and NGOs are helping local officials understand and communicate the financial case for investment in resilience by pointing to the benefits of discounted residential flood insurance premiums that can be secured when communities achieve higher ratings under FEMA's Community Rating System (CRS). "All communities that participate in the National Flood Insurance Program are eligible," said Andrew Hadsell, unit manager for the Amec Foster Wheeler office in Raleigh, North Carolina.

Communities enter the CRS system at a 10, and when they take actions prescribed by FEMA, they can achieve lower ratings—with each step cutting NFIP premiums for property owners in flood zones by 5%. "The community makes commitments to hazard mitigation and resilience through participating in these activities, and private property owners carrying flood insurance get that reduction in premiums," said Hadsell.

Amec Foster Wheeler assisted Charleston, South Carolina, in lowering its CRS rating from a 7 to a 6, according to Hadsell, and this saves city residents \$1.2 million annually on their flood insurance policies. "If Charleston can go from a 6 to a 5 [NFIP policyholders will] save another \$1.2 million."

"We have this discussion [about CRS ratings] with every local government we work with. If we can help a local government recognize the benefits of investing in the CRS program, we can help them develop a path forward," Hadsell continued, adding that achieving ratings of 7 or 8 can be done relatively easily. "When you start trying to achieve a 5 through 1, the investments become big ticket items, such as updating watershed management plans."

While CRS can be considered a federal "carrot" for local governments to invest in resilience and adaptation, "FEMA's interest in local governments putting consideration into identifying and planning mitigation for possible climate change impacts, such as sea level rise—and having this in-

Adaptation Planning is Evolving but Still 'Soft'

Most state and local governments are at the early phases of adapting. The dominant focus has been on "soft" activities like planning, vulnerability assessments, and capacity building. While planning is occurring at all levels of government and plans are becoming more sophisticated in their analysis of potential impacts and consideration of policy responses, planning is occurring in an ad hoc manner.

This is primarily because there are few incentives, mandates or dedicated sources of funding for adaptation. As a result, adaptation planning is taking many make-shift forms that reflect different local champions (for example, senior policymakers, agency staff, or community activists), threats (such as sea-level rise and urban heat-island effect), and vulnerable sectors (such as transportation and ecosystems).

New incentives and mandates include: President Obama's January 2015 Executive Order making federal flood risk management policies more robust (which resulted FEMA requiring climate to be considered in state hazard mitigation plans) and HUD's \$1 billion National Disaster Resilience Competition.

As the level of scientific understanding and technical capacity increases, more and more jurisdictions are planning to meet unique local needs. Fifteen states have completed comprehensive, state-led adaptation plans (AK, CA, CO, CT, DE, FL, ME, MD, MA, NH, NY, OR, PA, VA, and WA); an additional seven states (HI, MI, MN, NJ, RI, VT, WI) are undertaking some form of adaptation planning that is either either in progress, academically driven, or sector-specific; and at least 50 local jurisdictions have adaptation plans that take a variety of forms.

Few states and communities are implementing their plans by making "hard" changes in law or policy that alter regulatory and management decisions in light of projected climate change.

Adapted and updated from Lessons from the Front Lines; a Synthesis Report to the Kresge Foundation, Georgetown Climate Center, July 2014

formation considered in hazard mitigation plans—may be considered a stick," said Hadsell.

"Hazard mitigation plans are now required to include a section that addresses climate change adaptation," he said. "For a lot of communities, there's nothing of concern. But when you start talking about coastal communities and communities subject to drought, the FEMA requirement promotes understanding of the need for increased resilience over time."

Amec Foster Wheeler's client Charleston was badly flooded in October 2015 with a "days-long onslaught of tidal flooding, high surf and beach erosion," as described by Weather.com. Before the flood waters had receded, FEMA was opening disaster assistance centers and urging eligible individuals and business owners to apply for federal assistance. "Fortunately, Charleston is very good about maintaining

their hazard mitigation plans. If they had not maintained it on that five-year cycle, when the federal disaster designation went into place, that community would have been told it wasn't eligible [for mitigation funds]," said Hadsell. (An up-to-date plan is not needed to be eligible for assistance funds after a disaster.)

FEMA's requirements for state hazard mitigation plans are becoming more robust, according to Erika Spanger-Siegfried, senior analyst in the Union of Concerned Scientists Climate and Energy program. "When it comes time for a state to submit its updated plan, it will now need to factor in climate change. We also expect FEMA's technical mapping advisory council to come out with new recommendations to account for sea level rise in future updates to its maps," said Spanger-Siegfried. "These changes will better represent the world we live in."

“The question of how to make flood insurance affordable for people is a vital one we need to tackle as rates come in line with risk,” added Spanger-Siegfried. “We need to stop making decisions upon which people’s safety, homes, and future depend that aren’t reality-based. But we need to make sure people can cope with the costs.” While proposals exist to manage costs, even the recent updates to FEMA flood maps can push flood insurance premiums up, heightening local government leaders’ incentive to improve their CRS ratings, according to Spanger-Siegfried.

SEA LEVEL RISE RISK TO AFFECT PROPERTY VALUES?

In addition to the opportunity to reduce residential flood insurance premiums—or mitigate future increases in premiums—a potential new driver to investing in resilience may lie in risk assessments and disclosures for individual properties. On the large commercial development scale, insurance companies and assurance firms such as PWC are working with the UN and NGOs to advocate that lenders require large commercial borrowers in vulnerable coastal cities to conduct 1-in-100 stress tests to determine how their properties will fare in storms made worse by climate change and sea level rise. (More on EBI’s website: see “Large insurers speak louder on climate change”).

In highly vulnerable Florida, an environmental attorney and law professor, Albert J. Slap, and a team of climate scientists including Keren Bolter have teamed up to create Coastal Risk Rapid Assessment, an flood risk assessment tool for coastal properties. “Right now, when you look at property values, the closer a property is to the coastline, the more value is added to the property,” said Bolter.

With sea level rise, many coastal properties will be physically vulnerable to flooding—and susceptible to increasing flood insurance rates of the nature mentioned by UCS’s Spanger-Siegfried. “This is a real risk that people don’t think about,” said Bolter. “Ultimately, this should be a disclosure requirement, like a termite inspection.”

“We created this tool because the existing datasets in the public domain are hard to use and interpret,” said Bolter. “Our goal is democratize this data by taking government datasets at the highest level of accuracy available and putting that data through our algorithm in a way that makes it usable for a property owner or buyer in any coastal county in the country.”

The CRRA works by taking a range of sea level rise projections and evaluating how much more often a property will be flooded in the future. Properties are scored by the estimated number of flood days during a 30-year mortgage period, with the progression broken into five-year increments. A sample CRRA score shared with CCBJ shows a property on Key Biscayne going from zero flood days in 2020 to between 11 and 20 by 2035.

“While climate-informed science is more mature in coastal areas and perhaps not yet viable in riverine areas, it is almost universally recognized that climate change... will lead to significant changes in flood risk.”

Coastal Risk Consulting takes on a wide range of projects for local governments, including peer reviews of stormwater management plans developed by engineering companies. But Bolter foresees use of the CRRA becoming widespread in coastal communities. The firm has automated the CRRA for most of South Florida and anticipates automating it for the entire U.S. by 2017.

Bolter points to Hurricane Sandy as the top illustration of why changing flood risks for coastal properties should become part of real estate transactions. “I’ve looked at Zillow for the price history of some coastal properties in New Jersey. It’s not uncommon to see a property that was valued at \$500,000 before Sandy now selling for \$150,000.”

From the perspective of local government leaders, quantifying the threats to coastal real estate—and seeing those threats reflected in diminished property values—could create more of the urgency they need to prioritize investing in resilience.

“I think the private market is going to be the most forceful in vulnerable coastal communities with a lot of high value real estate,” said Jessica Grannis, adaptation program manager for the **Georgetown Climate Center**. “Politicians all have very short time horizons. They’re not looking ahead 50 or 100 years to evaluate how climate change will affect these structures near the shorelines.”

FLOODING BIG DRIVER FOR RESILIENCE IN MIDWEST

While coastal cities worry about flooding from rising seas, many Midwestern cities are concerned about record-setting floods from creeks and rivers—and increasingly, from urban runoff made more severe by the higher rainfall amounts.

NACO’s Linda Langston said the June 2008 floods in Cedar Rapids, Iowa, galvanized local governments there to improve their resilience to flooding. “Flood stage on the Cedar River is about 12 feet, and previous floods over the last 150 years had gone to 21 or 22 feet four times,” said Langston. “In this case, the flood went to 31 feet, and the velocity was much faster and more damaging than anything we’d experienced before.”

Langston says that climate change denial is slowly eroding away in Iowa—where corn and other commodity crop farmers are highly dependent on summer rains. “Farmers who have been farming for generations are pragmatic people,” she said. “They may not talk about ‘climate change,’ but they will freely admit that the weather has been weird.”

“While this summer [of 2015] has seen intermittent rain, for the previous three years we had a lot of rain in spring and into early summer to about the Fourth of July, then no rain for eight weeks. That had a lot of impact on commodity crops.”

Ceil Strauss, Minnesota state floodplain manager, described an increase in “higher intensity events” over the last 10 years. “We have been seeing more floods from storms that are in the 10, 12 and 14 inch range,” said Strauss. “We’ve always had those in the past, but maybe every 10 years. We’ve had quite a few in the last decade.”

To provide new revenues for flood control and stormwater management, hundreds of U.S. communities have created stormwater utilities that charge property owners fees based on their estimated runoff to the sewer systems. The increases and change in precipitation patterns in the Midwest may lead more communities to take this route.

WET-DRY CYCLES BRING WATER QUALITY ISSUES

Water utilities and stormwater managers in Midwestern states and cities are also “looking very hard at how changing weather patterns could affect their water quality,” said Tony Mardam, **Stanley Consultants’** practice leader for water. “Some of our cities now are seeing patterns of one dry year followed by one wet year,” said Mardam. In agricultural states like Iowa, this means that during the wet year, “a lot more fertilizer will run off into creeks and rivers than you expect.”

“Some Midwestern clients are seeing water quality deteriorate because of more frequent and pronounced swings between wet and dry years,” said Mardam. “The stochastic models prepared by hydraulic researchers clearly show this is happening, and we’re seeing it as engineers when we sample the water sources. Fertilizer runoff is becoming a growing problem in quite a few watersheds due to this developing bi-annual pattern of wet years following dry years.”

A recent study of flooding in Illinois surprised the state’s floodplain manager. “The face of flooding in Illinois has changed,” said Paul Osman, manager of Statewide Floodplain Programs for the state **Office of Water Resources**. “We have done a very good job mitigating flood losses in mapped floodplains. Those losses are declining. However, flood losses outside of the floodplain are on the increase primar-

Association of State Floodplain Managers Endorses the 2015 Federal Flood Risk Management Standard

The standard the United States has used for the last 38 years (built to the base flood elevation) is simply not working to reduce flood losses. Annual flood losses have increased from \$5.6 billion per year in the 1990s to well over \$10 billion in the 2000s. Furthermore, flood losses don’t end at the boundary of the 100-year floodplain, as 25 percent of the dollar losses in the National Flood Insurance Program occur outside of the 100-year floodplain.

These numbers show that the nation can no longer afford to design to the old standard. The freeboard and 500-year approaches are pragmatic and widely implemented by states and communities already. In fact, more than 62 percent of the U.S. population lives in a community with at least 1 foot of freeboard that applies to all development activities, not just federal actions.

And while the climate-informed science approach is more mature in coastal areas and perhaps not yet viable in riverine areas, it is almost universally recognized that climate change is happening and that it will lead to significant changes in flood risk.

This standard does not attempt to address the causes of those changes, but appropriately focuses on how federal dollars should be spent in order to protect the taxpayer’s investment. Finally, ASFPM appreciates the flexibility in the standard, enabling agencies to determine the most appropriate approach for a given federal action. While we do have detailed suggestions and comments for improving the FFRMS, ASFPM nonetheless is fully supportive of the standard.

Excerpted from April 2015 Comments from Association of State Floodplain Managers

ily in urban areas [and] caused by short-term and localized extreme rainfall events which exceed storm sewer design capacities. [These] now account for 90 percent of damages.”

Climate change is pegged as a factor in this trend in Illinois flooding, according to a summary of the report by Illinois Public Radio. “Average temperatures in Illinois have warmed by about 1 degree over the last century. And warmer air can hold more water vapor,” states the IPR summary.

“That could explain why precipitation in Illinois has increased 10 percent over the past 100 years — from an average of 36 inches a year to 40. Over the past decade, Illinois cities experienced an average of 1.8 storms with 4 or more inches of rain — the highest that rate has ever been.”

Not coincidentally, it was in Illinois where Farmers Insurance affiliates sued local governments for failing to plan for climate change—and thereby exposing Farmers’ insureds to damages. In Illinois sued several municipalities. “We are very aware of the Farmers Lawsuit,” said Os-

man, who defended the affected communities as “doing exemplary work [with] very proactive floodplain and stormwater programs.”

MANAGERS NEED BETTER DATA ON CLIMATE CHANGE

What they’re lacking is “the data to support long-term and proactive planning,” said Osman. In Illinois and the Midwest generally, Osman says “we are struggling to find quantitative data to plan for climate change. If the data were there, I have absolutely no doubt our communities would adopt those strategies. As you know, Farmers withdrew the lawsuit. I suspect they realized the same truth. The lawsuit has had no impact on voters or public officials as far as I know.”

While good localized data on climate change impacts may be lacking, planning for flood resilience is still increasing. Louise Yeung, an urban planner for the **Chicago Metropolitan Agency for Planning**, told CCBJ that “there’s a great deal of assessment work around urban flooding” due to basement and sewer back-ups rather than riverine flooding within a floodplain.

Another recent study enabled by the Urban Flooding Awareness Act passed by the Illinois General Assembly found that urban flooding has cost Illinois communities over \$2.3 billion of document damages from 2007-2014 and is expected to be exacerbated further by climate change.

Many Illinois communities are taking proactive approaches to building climate change resilience, according to Yeung. “The City of Chicago is doing a tremendous amount of work around climate resilience and was recently named one of the Rockefeller 100 Resilient Cities,” said Yeung. “They have been focusing on connecting climate action to green infrastructure and workforce development as well.”

And four jurisdictions in Illinois—Chicago, Cook County, DuPage County and the state—made it into the final round of HUD’s National Disaster Resilience Competition, according to Yeung. Awards from the \$1 billion fund will be announced in December 2015. Nationwide, 40 communities made it through the first screening, according to the NDRC website.

MORE THAN JUST ENGINEERING

As communities look to improve their resilience to flooding, sea level rise and other climate change impacts, leaders—and the consulting firms that want to work for them—must focus not just on upgrading infrastructure but also on planning for—and urging residents and businesses to plan for—the next disaster, whether it’s climate-related or not.

“If you’re a business consultant in this arena and you’re talking about climate change, I think one of the best offers you could make is to help businesses and local governments with their contingency plans,” said Langston. “Your business would become the friend of every state hazard mitigation officer and emergency planner. And building these kinds of relationships is also going to do your firm good.”

In late October 2015, Hurricane Patricia plowed through the western Mexico state of Jalisco—but with very few casualties because Mexican authorities had les-

sons “from botched or inadequate responses to earlier catastrophes,” according to a New York Times story quoting Richard Olson, director of the Extreme Events Institute at **Florida International University**. “It looks like they got this one right.”

“Mexico now has a national emergency response system that reaches from the central government to the local level. “There was a strong learning curve and they put resources into it,” Mr. Olson said.” Effective measures included warning local residents on radio, TV and social media and evacuating people well ahead of the storm.

Amec Foster Wheeler’s Andrew Hadsell points to the need to convey the message “Turn around, don’t drown” to drivers in flooded regions. “This is one of the biggest issues with flood risk,” he said. “It is so challenging to convey this message to the general public.”

“I was frustrated during recent storms because a network television channel in the Norfolk area was showing video of people water skiing behind cars through flooded waters, and we constantly see cars driving through water as it rapidly rises in roadway-overtopping scenarios,” said Hadsell. “This is an excellent example of an opportunity for local governments to promote risk communication and increase awareness of the variety of potential impacts from flood hazards.”

From better communications around how to drive in a flood to massive infrastructure projects like those described in the living shorelines story in this issue, extreme weather and climate change seem to be presenting a growing number of new opportunities for businesses to provide solutions to local governments. ■

“If you’re a consultant talking about climate change, one of the best offers you could make is to help businesses and local governments with their contingency plans.”

ARUP ADVOCATES RESILIENCE BEFORE THE STORM

Greater understanding of the economic value at risk will lead to greater investment in resilience

From evaluating long-term flood mitigation design strategies for New York City Transit to building bioswales across nearly 1,400 acres in the city, **Arup** is engaging on a variety of fronts to improve resilience for New York and other coastal cities vulnerable to flooding from sea level rise and storm surges.

The UK-based global design and engineering firm, with 13,000 employees and £1.05 billion in revenues for the year ending March 31, 2014, is also an international thought leader on urban resilience, as demonstrated by its six-year lead partnership with the **C40 Cities Climate Leadership Group** and its work with the **Rockefeller Foundation’s** 100 Resilient Cities initiative.

Like other firms (including some highlighted in this issue) that support national and international urban resilience initiatives, Arup donates a portion of its services to these efforts. According to Brian Swett, Director of Cities and Sustainable Real Estate, this past summer Arup “renewed and deepened” its partnership with C40 with a new 3-year commitment of \$1 million in donated research and consultancy services to further improve the measurement, management and strategic planning of climate action in cities.

Rockefeller Foundation, on the other hand, has paid Arup an undisclosed amount for services, especially work on the foundation’s Resilient Cities Framework, which “provides a lens to understand the complexity of cities and the drivers that contribute to their resilience,” according to the Foundation’s website. “Looking at these drivers can help cities to assess the extent of their resilience, to identify critical areas of weakness, and to identify actions and programs to improve the city’s resilience.”

As can be seen with a quick glance at the 12 indicators of city resilience in the sidebar to this story, the Framework sets a high bar for cities that are already struggling with poverty, crime, crumbling infrastructure and chronic financial shortfalls. When climate change risks—especially flooding from rising seas and stronger storms—are layered on top of existing issues, urban resilience becomes a daunting challenge indeed. Swett adds that the barriers to investing in resilience are just as strong in the private sector. “For most commercial property developers, the financial incentives are not often aligned to encourage long-term thinking,” he said.

“Even long-term property owners look at quarterly returns, while buyers and flippers of property look at hold periods of less than a couple years. It’s hard to convince these people to invest in resilience for 30 years instead of a new lobby and other bells and whistles that will have a more immediate impact on their lease income or sales value.”

To make the case for investing in resilience, Swett and his colleagues try to highlight the theme articulated in the UK’s 2006 Stern Review on the Economics of Climate Change. The report said essentially that without dramatic GHG reductions climate change would cost the world economy between 5% and 20% of GDP annually.

The Stern Review mentioned adaptation but focused primarily on GHG mitigation. The intervening years have seen little progress on that front—and at the same time, it has become more widely understood that even if global GHG production starts coming down within a decade or two, a certain amount of climate change is “locked in” by existing GHG concentrations in the atmosphere.

In this context, advocates of resilience and adaptation echo Stern’s focus on the costs of inaction. “Using scientific information to prepare for climate changes in advance can provide economic opportunities, and proactively managing the risks can reduce impacts and costs over time,” noted the authors of the most recent (2014) U.S. National Climate Change Assessment.

“The largest factor in favor of investing in resilience is greater understanding of the economic value at risk due to lack of action,” said Swett. “I’m not just talking about insurance rates going up as the FEMA flood zone maps are updated. I’m talking about large scale business disruption like we experienced in the Boston area during the extreme storms this past winter.”

“When people can’t get to work, businesses and schools shut down and parents have to stay home to take care of the kids, there are real economic losses,” said Swett.

VALUE OF CITIES AT RISK

Swett, who was chief of Environment, Energy and Open Space for the City of Boston prior to joining Arup in July 2015, told CCBJ that to build support for Boston’s advocacy for more proactive federal spending on resilience, his team analyzed the economic value at risk in the 10 largest U.S. coastal metropolitan areas.

“They represented almost one-third of the entire U.S. economy, not counting throughput. If you added in the activity at the ports of Los Angeles, Long Beach, New York, Boston and Oakland, you’d see that there is a huge amount of economic activity that’s at risk from sea level rise and storm surge impacts,” he said.

“With that kind of data, you can start to have a different conversation, not as much about recovery from a disaster but the economic importance of protecting vulnerable cities,” said Swett.

While working for the City of Boston, Swett and his colleagues began to enlist what he called the “natural allies,” for investing in resilience: long-term real estate owners. “There are large owners like Boston Properties, where I used to work, that buy and develop buildings with the intent to own them for the long term. There are also medical institutions and university campuses with the long-term perspective that more easily justifies resilience investments.”

SANDY A “NEAR MISS”

“I’m cautiously optimistic that Boston will be one of the most pro-active cities at

doing resilience before the storm,” continued Swett. “Sandy was a near miss for us, and not by miles but by a couple of hours. If it had hit five hours earlier, at high tide, Boston also would have experienced a 100-year flood event, with about 6 percent of the city inundated.”

“That catalyzed attention from the long-term owners, especially members of the **Green Ribbon Commission**,” a group of business and institutional leaders formed in 2011 to boost greenhouse gas reduction actions and climate adaptation in the city and metro area. “The Commission has been pursuing a variety of climate change initiatives and long-term planning assessments to better understand and tackle this vulnerability.”

Even without factoring in the broader economic losses that would accompany climate-related disasters in Boston, the Green Ribbon Commission estimates \$463 billion worth of real estate assets are at risk of flooding and damage associated with sea level rise, according to its website. Swett cited a World Bank-McKinsey study that ranked Boston as the fourth most at-risk city in the United States “after New York, Miami and New Orleans,” he said.

And as Swett reports, that value is growing rapidly. “Boston is now experiencing a real estate renaissance like we’ve never experienced before,” he said. “There’s more waterfront commercial and residential development going on than in our entire history, a lot of it in areas that will be at risk in the next 50 to 100 years.”

“It will be a lot easier to mitigate flood risks upfront than after the build-out,” said Swett. “At the same time, we have to address existing buildings. We’ve been looking quite a bit at the practices emerging in New York City.”

Within Arup, Swett and his colleagues are focused on deepening the firm’s “engagements with mayors, city governments, developers, infrastructure owners, and other key urban stakeholders” in the Americas—source of just under 15% of the firm’s FY 2014 revenues. Their aim: to support “sustainable, thriving, and climate change resilient cities,” according to the news release announcing his July 2015 hiring.

“I’m using my experiences as a former city official and developer in the real estate industry to identify new and deeper ways we can better serve these critical actors in climate action and sustainable development, and build on Arup’s existing engagements, such as our work with Washington, DC, on its groundbreaking sustainability plan and our work in New York City,” he told CCBJ.

Arup is also lending its expertise to public awareness campaigns. “Communicating with the public is a vital piece of this,” said Swett. “It’s important that these conversations about resilience not be limited to the policy circles or the academic ivory towers.”

Swett pointed to Arup’s work with the Rockefeller Foundation to create a city resilience framework as a good source of “critical questions for residents and building owners.” And he credited the **Kresge Foundation** for “doing some fantastic work funding local-level resilience groups in East Boston and other communities around the country.”

GREENING THE BIG APPLE FOR RESILIENCE

Arup is the lead consultant on a program to deploy as many curbside bioswales as possible across 1,400 acres in Brooklyn, the Bronx and Queens. “It’s a strategy to deal with their combined sewer overflow issues as well as improving the management of stormwater runoff on these urban streets,” said Swett’s colleague Vincent Lee, civil engineer.

The bioswales will look like “small little pocket gardens along the streets,” said Lee, adding that the city is targeting to deploy thousands of these within the next couple years.. “They have set goals of managing an inch of rain on 10 percent of existing impervious surfaces by 2030. When you work that out across a city as large as New York, that’s a very ambitious undertaking.”

The NYCDEP program will target priority watersheds. The neighborhoods (some of which are poor—“underserved” in official parlance) in these watersheds will gain multiple benefits from the implementation of green infrastructure. In addition

to providing new landscaping in the urban setting, as the trees planted on this vast but dispersed acreage mature, the green infrastructure will reduce urban heat island effects, reduce energy used to cool adjacent buildings and absorb CO2, notes Lee.

On the vast and vulnerable New York City waterfront, Arup is the prime consultant and infrastructure designer for Hunter’s Point South, a multi-use development in Long Island City, Queens, that will deploy “a mix of hard and soft infrastructure to provide coastal protection as well as natural habitat and ecosystem services,” according to Lee.

“This is a big push now in the city and elsewhere,” he said. “Your traditional coastal protection project in an urban area has consisted of grey infrastructure, for example, a wall or bulkhead. These provide protection but don’t offer any aesthetic, recreational or water quality benefits, and they can cause more erosion on adjacent areas... Hunter’s Point South will incorporate a complementary mix of grey and green infrastructure including coastal wetlands that are integrated with a waterfront park, so eventually you’ll see people taking strolls along this vital green infrastructure system,” said Lee.

APPLYING SEISMIC MODELING TO FLOODING, DROUGHT

Far from the Northeast in water-stressed California, Swett told CCBJ that Arup’s experience in seismic risk modeling will provide significant value to water utilities and other clients planning to cope with long-term drought and climate change. “Seismic risk modeling tools for Western cities are actually more well developed than hurricane risk models for Northeastern cities,” he said.

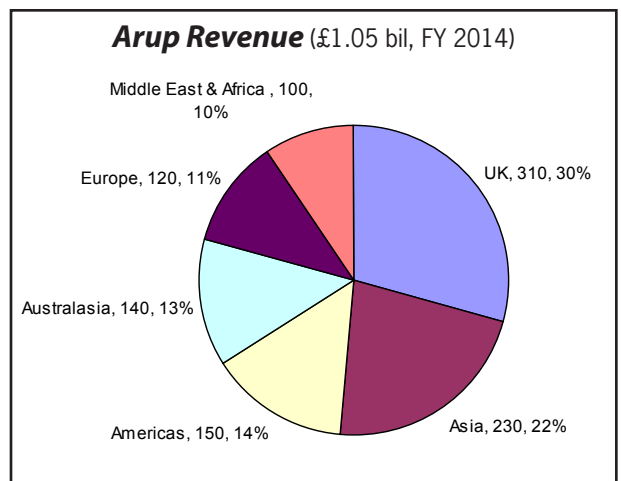
Lee added that the Resilience-based Earthquake Design Initiative (REDi) rating system—developed by Arup with contributions from experts at the cities of San Francisco and Los Angeles, Stanford, Berkeley, SUNY and various consulting firms and property

owners—is now being expanded by Arup to model flood risks. “While the impacts are obviously different, similar prediction modeling techniques can be applied,” said Swett. “You’re trying to figure out the likelihood of an event occurring and assessing what is the appropriate response. Building on the seismic risk assessment methodology and tools provides a good basis for evaluating the impacts of other natural hazard events.”

Swett averred that Arup’s ownership structure—its shares are held in trust for the benefit of its employees—“allows us to think longer term and invest in R&D.”

“Currently, more than 50 percent of the world’s population is living in cities,” he said. “That will cross 70 percent in the coming decades. Focusing on urban resilience for us is about doing what’s right and shaping the marketplace.”

“Unfortunately, the vast majority of interest in resilience happens after the natural hazard event,” he said. “We’re seeking to work with groups like the **Urban Sustainability Directors Network, Urban Land Institute, C40, Rockefeller** and others to catalyze action before the next storm or flood.” And for better or worse, it’s the fast growing cities that provide the best opportunities to do this. “When cities are experiencing real estate booms and have many major projects underway, that’s the right time to invest in resilience,” said Swett. “If you’re underwriting a project that you expect to still be vibrant in 70 years, you have to understand and prepare for what your city will be dealing with 70 years from now.” ■



12 Indicators of a Resilient City

1. Minimal human vulnerability. Indicated by the extent to which everyone's basic needs are met.
2. Diverse livelihoods and employment. Facilitated by access to finance, ability to accrue savings, skills training, business support and social welfare.
3. Adequate safeguards to human life and health. Relying on integrated health facilities and services, and responsive emergency services.
4. Collective identity and mutual support. Observed as active community engagement, strong social networks and social integration.
5. Social stability and security. Including law enforcement, crime prevention, justice, and emergency management.
6. Availability of financial resources and contingency funds. Observed as sound financial management, diverse revenue streams, the ability to attract business investment, adequate investment, and emergency funds.
7. Reduced physical exposure and vulnerability. Indicated by environmental stewardship; appropriate infrastructure; effective land use planning; and enforcement of planning regulations.
8. Continuity of critical services. Indicated by diverse provision and active management; maintenance of ecosystems and infrastructure; and contingency planning
9. Reliable communications and mobility. Indicated by diverse and affordable multi-modal transport systems and information and communication technology (ICT) networks; and contingency planning.
10. Effective leadership and management. Involving government, business and civil society, and indicated by trusted individuals; multi-stakeholder consultation; and evidence-based decision-making.
11. Empowered stakeholders. Indicated by education for all, and access to up-to-date information and knowledge to enable people and organisations to take appropriate action.
12. Integrated development planning. Presence of a city vision; an integrated development strategy; and plans that are regularly reviewed and updated by cross-departmental working groups.

Source: City Resilience Framework: Rockefeller Foundation, Arup

WESTON SOLUTIONS ADAPTS TO FEDERAL MARKET CHALLENGES, BUILDS ON REPUTATION AND RELATIONSHIPS

Weston Solutions is an employee-owned environmental management company serving clients in federal, state and local government, as well as commercial and industrial sectors. The 58-year-old firm characterizes its core service areas as environmental services and infrastructure improvement. Weston reported 2014 revenue of \$316 million, 70% of which were estimated as from environmental services. Alan Solow became president and CEO in September 2014 after more than three decades of experience in the engineering, construction and environmental remediation industries. After 24 years with Weston, Solow became senior vice president of Shaw Environmental and Infrastructure in 2010, then CEO of Cabrera Services, a leader in characterization and environmental remediation of radiological contamination, from 2012 to 2014.

EBJ: What have been some of the business highlights of the last year for Weston Solutions?

Solow: Weston has had to manage through significant losses on a large construction project for the Department of State in Taiwan. I am happy to say that we are nearing Substantial Completion and that the vast majority of the project is behind us. Now we're better positioned for growth, exiting higher risk businesses, extending our core environmental and secure construction services and identifying alternative options to improve our capital structure.

Our cost structure is now better aligned with current revenue, and the past few months have demonstrated solid profitability in all of our service areas. We're reorganized around our federal and commercial, state, and local government clients, and set up an Engineering, Science and Technology group.

In 2015, we have won some great projects that align with our strategic plan and are making a number of key hires to help us drive our growth initiatives going forward. Our 3rd quarter sales ended about 20% better than 3rd quarter results from last year, and we are continuing to have solid sales bookings in the 4th quarter. Since the beginning of the year, Weston has won about \$1.3 billion in new contract capacity.

EBJ: ENR ranks you as #44 in environmental firms and #15 in hazardous waste, and you reported that 75% of your 2014

revenue came from hazardous waste and remediation. What are some of the key trends affecting your business in this segment?

Solow: Weston's environmental and hazardous waste services remain large components of our DoD business. While restoration budgets have declined by about 30% over the past five years, the DERA (Defense Environmental Restoration) mix is beginning to shift from predominantly HTRW (Hazardous, Toxic and Radiological Waste) to more MMRP (Military Munitions Response Program). MMRP is a strength for Weston and offers better opportunity for higher margin work.

FUDS (Formerly Used Defense Sites) and FUSRAP (Formerly Utilized Sites Remedial Action Program) remain very long term programs, with limited but fairly stable annual budgets. While funding is flat and the debilitated appropriations process impacts the ability of our clients to put work out in a predictable manner, we recognize that funding for HTRW remains relatively robust for some of our legacy clients, including EPA and DOE, for whom we have worked for over 30 years.

Opportunities within these agencies also overlap in skillsets and experience our clients are looking for, so we will have the opportunity to leverage our traditional experience into some of the large opportunities we expect to see such as the remediation of uranium mines in the southwest and environmental restoration Federal sites, including Los Alamos National Laboratory.

EBJ: You have some innovative nuclear waste management technology. Can you briefly describe how it's positioning you for federal nuclear work, and how you see demand for those types of services evolving?

Solow: A significant portion of Weston's radiological and health physics projects involve cleaning up legacy uranium mine sites in the southwestern U.S. Two of the key problems we will encounter with this work are 1) efficiently monitoring very large areas of remote and rough terrain; 2) and accumulating, sharing, and managing the data associated with all phases of the projects.

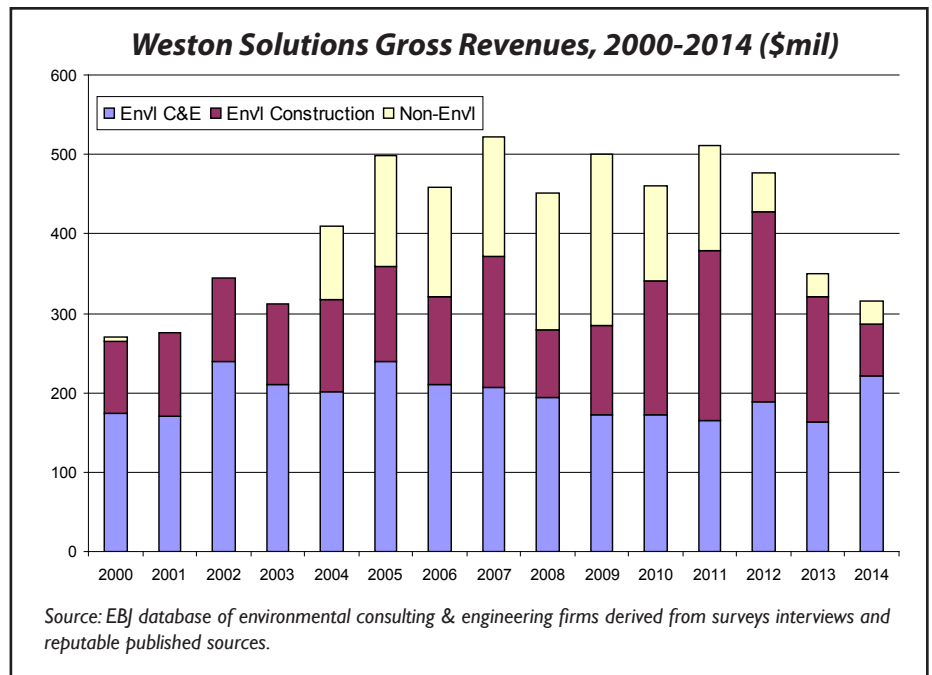
Weston's client strongly supports developing new technologies, and we are developing and implementing data management systems that linked to EPA's centralized database, as well as transmitting data in real-time to remote technical managers so they can make decisions regarding the need to collect more (or less) data, and post the data to Sharepoint sites for viewing by multiple offices.

These projects also involve characterizing large, remote land areas that include significant topographical and vegetative obstructions. This experience, in addition to our long term radiological and hazardous waste management experience at Sandia National Laboratory, will be key as we grow our presence with DOE and EPA.

EBJ: Aside from hazwaste/remediation, in what service areas are you seeing the most growth, and how do you expect that to evolve?

Solow: Beyond DoD remediation programs emphasis has shifted from MILCON (Military Construction) to SRM (Sustainment, Restoration and Modernization). SRM covers a broad scope of work, focused first on mission critical requirements which often involve security and operational fueling systems—two areas where Weston has grown and developed capabilities.

Commercial markets are being influenced by cheaper energy and more stringent air regulations, creating increased demand for air services for the chemical and power utility markets. Weston has made



several strategic hires to grow our practice to meet this demand.

EBJ: Looking at your three overall market segments—Federal, state & local and commercial-industrial—what can you say about what's driving growth in each of these market segments? And what are the main challenges to growing your business in each segment?

Solow: The challenges in Federal markets are the obvious impacts of declining budgets, DoD downsizing, and a lack of a Base Realignment and Closure program. These challenges will continue and client needs will remain on finding cost savings (energy) and priority on mission/operational requirements. Having the resources and skills, as well as the necessary contracts to help clients meet these needs, will be critical to growing our Federal business.

For a large business, this is further compounded by the continued Federal emphasis on direct contracting with Small Business, with the goals of most Federal clients exceeding 40% for FY16. Weston will need a continued strong relationship with SB partners.

We see our opportunities for commercial business growth in the confluence of changing fuel economics, the need to replace or repurpose aging infrastructure, and the continued emergence of new regulations. Demand for redevelopment driven

environmental projects continues, but at a slower pace.

EBJ: Where are you seeing demand for environmental work associated with redevelopment, and how do you see that market shaping up over the next year or two?

Solow: There are pockets of strength. Despite the government's best efforts, many desirable properties that were part of past BRAC (Base Realignment and Closure) programs remain unused because of incomplete development plans and needed environmental remediation. These programs move slowly so firms in this market must be patient and very strategic.

Weston has targeted several properties across the country that have market attractions and significant environmental issues, and we're working with local development partners to execute significant projects over the next two years. Long term, without additional Federal BRAC programs or public investment in abandoned properties, the supply of desirable redevelopment properties with environmental issues will continue to diminish, making this market more limited with time.

EBJ: The oil and gas industry has cut way back on E&P, with unfortunate effects on the environmental consulting field. Are there any bright spots in oil and gas, such as due diligence related to M&A or upgrades to compression stations to comply

with EPA's evolving air regulations?

Solow: Although exploration and production (i.e. upstream) capital spending has decreased along with commodity prices, the midstream and downstream sectors have seen stable to rising spending. This coupled with new EPA regulations, such as those relating to benzene and methane emissions, will act to offset the effects from the upstream side of the business.

We also think continued spending in petrochemical manufacturing, especially on the Texas and Louisiana Gulf Coasts, will have a positive effect on environmental consulting revenues.

EBJ: You announced in September 2015 a 15-year contract to operate the new anaerobic treatment system and 150kW solar energy plant at the ReSolve Superfund site in North Dartmouth—a continuation of your work there since 1997. Would you describe this as an alternate delivery or performance-based contract? If so, what were the key elements in negotiating a deal that worked for Weston and your client?

Solow: We would describe it as a hybrid between Alternate Delivery and Performance-Based. Weston's approach to finance, operate and maintain the water treatment and solar generation systems is both creative and innovative. Our willingness to accept operational responsibility was based on past experience and proven pilot testing of the systems, as well as the capabilities of our team. We must drive efficiencies through preventive maintenance, operations skills and associated reduction in costs to succeed financially.

The framework and details are business confidential. However, I can say that a strong relationship and trust were necessary to pitch the idea. The client benefits in many ways, as there are economic and environmental benefits. More so, the client's representatives exhibit advocacy and leadership by demonstrating innovative technical and sustainable solutions. We are grateful to be their long-term implementation partner.

EBJ: What are your thoughts about alternate delivery in general? Are you experi-

encing more pressure from clients to take on performance-based or risk-transferred contracts? If so, how are you threading the needle between wanting to be "client-centered" and looking out for your employee/owners?

Solow: Alternate delivery or risk transfer markets in commercial space is an area where Weston has reduced investment. Risk has grown as fewer insurance products are available making liability transfer not feasible for an employee-owned company.

In the Federal use of Performance Based Remediation, Low Priced Technically Acceptable selection, and risk transfer to the contractor is the norm and not the exception. Weston must deal with these realities to stay in this market by talking to our clients about their needs and evaluating lessons learned on past procurements to help provide better scopes and reduce our risk, as well as providing the best delivery models.

Additionally, we are focused on risk identification and mitigation, which enables us to be much more selective in bidding high risk work. This attention allows us to provide better feedback to our clients to enable them to help us and reduce their own risk.

We also know that some of our Federal clients still rely on Best Value selection for more complex procurements related to everything from remediation to security, energy, and SRM work. Additionally, time-critical work to meet urgent mission requirements, life safety challenges, or disaster response, demand the capability to deliver results using cost plus contracting. This is an area where Weston has excelled for years and where we retain strong capability and contracts.

EBJ: Is climate change playing any significant role in your business or shaping demand for your services in any appreciable way?

Solow: Weston's municipal engineering practice is focused on wastewater and storm water drainage engineering services driven by aging infrastructure rehabilitation needs and Clean Water Act compli-

ance. Opportunities for coastal infrastructure improvement is increasing but not yet playing an appreciable role in shaping our current business.

Several of our electric and gas delivery clients are spending billions of dollars of infrastructure upgrades to harden against severe weather systems after suffering significant power outages, among other resiliency improvements.

EBJ: Finally, you report about 7% of your business in water and wastewater. Given water stress in the West and reports of increased flooding in the Midwest, what can you tell us about how you expect demand for these services to evolve?

Solow: Water planning is already a key component of DoD installations and adjacent communities as they look ahead to a potential BRAC in the FY19 to FY21 timeframe. Installations where water to support mission and family requirements is uncertain will be prime targets for closure recommendations. Planning is being addressed more regionally than locally, and solutions will also be more regional. We expect this to be a growing need and opportunity with our Federal, especially DoD, clients.

Our nation's infrastructure has integrity issues due to age and is potentially stressed more due to climate change, as well as increased risks from overdue earthquakes in both the Midwest and West. Upgrades to this infrastructure, as well as an ability to respond quickly with repairs, is a client need and demand that the environmental industry must be able to meet. Market growth around infrastructure upgrades and repairs is happening now and will continue.

We expect Weston's storm water quality management and best management practice design practice in the West to grow as the California market acts to increasingly manage water in the face of ongoing drought. We see growth potential in drainage engineering services in other regions due to flooding trends and the continued expansion of municipal storm water regulations. ■

NORTHGATE GROWS WITH CALIFORNIA PROPERTY MARKETS

After diversifying to survive recession, Bay Area firm rides redevelopment wave

A small firm with just under 50 employees, **Northgate Environmental Management** weathered the Great Recession by ramping up its environmental services work for utilities and public sector clients, according to Principal Maile Smith. Since 2011, however, the firm's private sector work has surged on the strength of California's robust real estate development market. "From 2011 through 2014, we saw 75 percent growth [in revenues]," said Smith. "We project continued growth in 2015 and 2016, although probably not quite as high."

Northgate's core market "remains the real estate and development industry which is still very strong in Northern California and continues to fuel a lot of our work," said Smith. "We're doing a lot of brownfield development and we're starting to see brightfield opportunities," a term that refers to renewable energy projects on impaired properties.

"During the economic downturn, we saw a drop-off in the real estate sector but we successfully diversified into more utility, municipal and other local government agency contracts, from due diligence to compliance planning and support, to rapid remediation and redevelopment," said Smith. The firm's status as a small, women-owned business didn't hurt in competing for public-sector and utility contracts, Smith added.

"We have built some very strong relationships and continue to get a lot of work in those sectors." For example, Northgate provides environmental services in support of brownfields redevelopment, stormwater management, water quality planning and other needs to the City of Oakland under an as-needed contract.

Northgate has also avoided risky contract mechanisms that have become more common in the environmental industry, including performance-based remediation and contracts with clawback provisions. "I'd say that represents less than 1 percent

of our business," she said, estimating 75% of revenue is generated by time and materials contracts, with fixed-fee contracts making up almost all the rest.

FOCUS ON IN-DEPTH ANALYSES

The upfront services—site assessment for due diligence, investigation and characterization—are core competencies and constitute the largest revenue sources for Northgate. And for these critical services, the firm tries to maintain an edge over some competitors in its client relationships and emphasis on in-depth risk analyses, according to Smith.

"We have seen a trend toward commoditization of real estate due diligence," she said. "Our differentiator is that we emphasize really strong partnerships with our clients to help them understand their potential liabilities and risks from their business decisions. We don't advocate a low-cost, check-the-box approach." Smith judges that her firm's relationships with private clients and reputation for in-depth analyses—in addition to the newer customer base it has developed among public and utility entities—will position it to thrive if and when California's real estate market slows down again. "We'll be positioned to weather that storm, if and when it comes, because of our quality work and diversification."

VISUALIZATION TOOLS TO COMMUNICATE RISK

Another differentiator for Northgate has been its development and use of data visualization tools for clients, regulators and other stakeholders. "We're headquartered in the San Francisco Bay area, where the tech industry has a very welcome emphasis on design, user interface and user experience," said Smith.

Northgate has incorporated that influence by setting a team of specialists to work to come up with "new data man-

agement and data visualization tools that make our reports more accessible, with easy-to-understand graphics," said Smith. "This translates into more clearly communicating risk and making smarter remedial decisions."

When automated monitoring on remediation projects yields streams of data, "we sometimes collect that and serve it over the web for stakeholders and decision makers," said Smith. "Not only do the client and other users get to see those data in near real time, they can download and look at it in a much more detailed way than in traditional reports and presentations."

WATER POLICY AFFECTING REMEDIATION

While California's aggressive water policies—specifically 2014's Sustainable Groundwater Management Act and Prop. 1 Water Bond—are directed most at water resource management, Smith says the state's focus on water is permeating the remediation field.

"We're seeing more research and growth in how water issues are incorporated in all our projects," she said. "Water is at the forefront of nearly all our projects and the projects that we're going after."

The existing trend toward treating groundwater in place has gained more importance. "Groundwater is viewed much more as a resource that needs to remain in place for the remediation process, harnessing natural systems and using in situ treatment approaches," she said. And, while contaminated groundwater may not flow into water distribution systems anytime soon, Smith says climate variability and drought has "moved the goal posts" for how contaminated water is evaluated and managed.

"In the past there might have been a higher bar to reach for beneficial reuse [of contaminated groundwater]," Smith said. "Now, even shallow groundwater in areas that would not have been considered for beneficial reuse or a potential drinking water sources are being viewed in a different light because of the scarcity of water, drought and climate variability."

SURF LEADERSHIP

Taking a more holistic view of contaminated groundwater treatment and management reflects to some degree the principles that Smith and many of her colleagues in the remediation business advocate through the nonprofit group SURF, the **Sustainable Remediation Forum**. SURF recommends bringing “together remediation and reuse on a collaborative parallel path and seeks to achieve whole-system sustainability benefits,” according to its website.

Smith, who is President of the SURF Board of Trustees, said a key distinction between sustainable and unsustainable remediation practices is better accounting for the externalities. “[Externalities] could be noise or other nuisances to occupants or neighbors. It could be direct impacts on air quality from trucking materials to a landfill or air stripping groundwater,” she said.

While SURF publishes guidance for sustainable remediation, there’s no certification body equivalent to the U.S. Green Building Council, with its LEED rating system, according to Smith. “There are currently entities thinking about a certification or an award [system] that would be applied to a green or sustainable remediation project.” She also added that ASTM and the Interstate Technology and Regulatory Council have published guidance for sustainable and green remediation.

Smith acknowledges that the demand for sustainable remediation comes primarily from clients, with encouragement from consultants in many cases. “Most regulators are not asking for this yet,” she said. And the group’s biggest obstacle is “a poor understanding of what sustainable remediation is” and the “perception that sustainable remediation means walking away from a site or doing less” than one would otherwise. “Changing these perceptions is what we’re working on constantly.”

But SURF is no fringe group, and the organization has heavy-hitting supporters on both the consulting and client sides: According to its latest newsletter, SURF’s largest “Gold” financial supporters include Boeing, BP, CH2M, Dupont and Shell. Among “Silver” backers are AECOM, Amec Foster Wheeler, CDM Smith, Haley

& Aldrich, Langan Engineering and Terra Systems. “Bronze” supporters include Envirocon, ExxonMobil and Tetra Tech.

Smith has bi-weekly teleconference meetings with her fellow board members, who include senior executives from many of the largest firms in the environmental industry, as well as clients Chevron and Boeing. “We also sponsor technical meetings twice a year and one webinar annually [focusing on] the challenges and themes that will be of most interest to our members.”

On the business side, Northgate frequently teams with firms of all sizes. “Northgate has a very trusted network of teaming partners,” she said. “We don’t hesitate to collaborate on projects as the prime or as a subcontractor, including with some of the biggest players in our industry. We love to collaborate and team, and this has been a very successful model for Northgate.”

An S Corporation, privately owned by shareholders, Northgate will even sometimes create special-purpose vehicles with collaborators, including JVs and LLCs. “Also, we engage in the traditional prime contractor-subcontractor relationships,” said Smith. “Sometimes we’re in a good position [to be prime contractor] with our women-owned, small business certification. Sometimes we’re there as an equal partner. We’re very strong technically and are proud that we can go head to head with firms of any size.” □

“We have seen a trend toward commoditization of real estate due diligence... Our differentiator is that we emphasize really strong partnerships with our clients to help them understand their potential liabilities and risks.”

2016 Outlook in Energy, Chemicals and Construction

The U.S. Energy Information Administration (EIA) reports that Brent Crude Oil prices averaged \$44/barrel in November 2016, a \$4/b decrease from October. Global oil inventories increased by 1.3 million barrels per day in November, putting downward pressure on prices. EIA forecasts that Brent prices will average \$53/b in 2015 and \$56/b in 2016. The average price of U.S. gasoline was \$2.16/gallon in November, a decrease of 13 cents/gal from October and 75 cents/gal lower than in November 2014. EIA forecasts U.S. regular gasoline retail prices to average \$2.04/gal in December 2015 and \$2.36/gal for 2016. Total U.S. crude oil production declined by about 60,000 b/d in November compared with October 2015, and crude oil production is forecast to decrease until the third quarter of 2016. EIA expects U.S. crude oil production to average 8 million b/d in 2016 after 9.3 million b/d in 2015. Natural gas inventories were a record 4,009 billion cubic feet in November 2015, 16% higher than 2014. EIA expects the Henry Hub natural gas spot price to average \$2.47/MMBtu this winter compared with \$3.35 last winter. Electricity generated from natural gas exceeded coal in September 2015 for the third month in a row. Before April 2015, monthly generation from coal had always been larger than natural gas.

The U.S. chemicals industry grew 3.6% in 2015 despite global headwinds that included a strong appreciation of the U.S. dollar and a weakness in several key global markets. “The U.S. chemical industry renaissance is just getting started,” said Kevin Swift, chief economist of the **American Chemistry Council** and lead author of ACC’s Year-End 2015 Chemical Industry Situation and Outlook. Light vehicle sales were up 5% and housing starts were 12% in 2015: Each light vehicle contains \$3,500 worth and each new home approximately \$15,000 worth of chemical products. ACC forecasts a 2.9% increase in domestic chemical production in 2016, followed by a 4.4% expansion in 2017 and annual growth of over 4% the second half of the decade, outpacing the growth of the overall U.S. economy. As of December 2015,

more than 261 new chemical production projects had been announced since 2010 with a total value of more than \$158 billion, and a 34% were already complete or under construction.

On a macroeconomic level, the global economy faltered in 2015 with geopolitical uncertainty and recessions in Brazil, Russia, Japan and other nations, as well as a pronounced slowdown in China. The economies of the United Kingdom and the Euro area advanced, as did that of the United States. U.S. GDP growth in 2015 is expected to end at 2.6%. For the chemical industry, global production advanced just 2.8% in 2015, slightly lower than the 3.0% in 2014. Prospects will improve in 2016, with global output rising to 3.3% and then 3.7% in 2017. ACC says the most dynamic growth will be in the developing nations of Asia-Pacific, Africa and the Middle East, but competitive advantages from shale gas will keep U.S. production strong as well, while structural challenges will cause Western Europe and Japan to lag, helping the U.S. gain global market share.

Dodge Data & Analytics predicts that total U.S. construction starts for 2016 will rise 6% to \$712 billion, following gains of 9% in 2014 and an estimated 13% in 2015. "Much of this year's lift has come from nonbuilding construction, reflecting the start of several massive liquefied natural gas terminals in the Gulf Coast region, as well as renewed growth for new power plant starts. Residential building, up 18% this year, has witnessed continued strength for multifamily housing while single family housing seems to have re-established an upward trend after its 2014 plateau," said Robert Murray, chief economist for Dodge D&A. **FMI** estimates that construction activities grew 6% in 2015 (measured in value put in place not starts), up from 5% in 2014, and predicted a rise of 7% in 2016, reaching \$1.09 trillion, the highest total since 2008. The **ENR** Construction Industry Confidence Index survey reported that 88% of firms planned raises for their employees in 2016, with the average increase of 4.6%. In addition 72% said they plan additions to staff in 2016, 18% said they had no plans to add staff, while 10% were unsure. ■

THE SOURCE GROUP EXPECTS DOUBLE-DIGIT GROWTH AS MARKET STRENGTHENS IN CALIFORNIA

The Source Group, Inc. (SGI, headquartered in the San Francisco Bay Area) has four offices throughout California, approximately 65 employees and \$18 million gross annual revenue. SGI has been in business for 18 years, and specializes in managing complex subsurface contamination projects from initial site investigation to remedial design, engineering and remediation. SGI's also provides professional services in other environmental segments, including: Water Resource Services / Hydrogeological Studies; Regulatory Compliance / Environmental Management; and Insurance & Litigation Services. SGI's client mix is 60% private sector (a wide range of market segments), 40% public sector (mostly DoD, state and municipal). This EBJ Q&A is with Bruce Thrupp, Director of Business Development who has more than 8 years with SGI and 25 years experience in the industry.

EBJ: How has business been the past couple of years?

Bruce Thrupp: Business has generally been strong and growing for the last couple years. Revenue has grown over 20% cumulatively, over the last two years.

EBJ: Now that the 'Great Recession' is technically over in the U.S., how did the early crisis points and the subsequent economic slowdown affect your business?

Thrupp: The Great Recession caused a substantial negative impact on SGI revenue from 2009 thru 2011. Developer work was hardest hit, in addition to financial services. For last couple years, we've seen a growth in our Department of Defense (DoD) work, and development work. Oil and Gas was strong in 2012 and 2013, but has slowed in 2014 and 2015. In 2014-2015 we seen best growth in real estate development and financial services.

EBJ: How about the lowered prices of commodities and oil & gas: What impact has that had on your business and has it changed your approach at all?

Thrupp: The downturn in Oil & Gas has had a material negative impact on potential revenue growth. Because of it, we have reduced our marketing investment in the sector, for now.

EBJ: What has been the main thrust of your strategy over the past couple years?

Thrupp: Our main thrusts have included focusing on further developing exist-

ing large clients, diversifying into growing segments (e.g. compliance and utilities), and further developing our federal market work through teaming and mentoring relationships.

EBJ: Where do you see your best growth opportunities: in the short term; and in the long term; by customer, service, by media like air or water or geographic region?

Thrupp: In the short term it is current clients, development and brownfields. In the long term, it is utilities, compliance and green remediation. By media in both the short and long term in California, it is water. By geography we see the most opportunity in large, urban centers.

EBJ: What service areas are you looking at diversifying or for developing new business practices?

Thrupp: Water, green remediation, regulatory compliance (e.g. storm water)

EBJ: Are you seeking to evolve into a more integrated service provider?

Thrupp: Where possible, yes. For our company, this is where the increased emphasis on regulatory compliance comes into play.

EBJ: What new large contracts of note has your company been involved in the past two years?

Thrupp: New large contracts include DoD (DLA), utilities and redevelopment related remediation contracts.

EBJ: What have been your most noteworthy recent projects or business accomplishments?

Thrupp: Winning large State of California Department of Toxic Substances Control (DTSC) and DoD environmental assessment and remediation contracts in unrestricted competitive solicitations that included the largest competitors in our industry.

EBJ: What growth do you forecast, for your company and for the industry over the next 2-3 years?

Thrupp: We expect continued revenue growth between 10 and 20 percent annually. We expect our primary sector C&E environmental assessment & remediation to be relatively low growth, somewhere between 2 and 4%.

EBJ: What policy initiatives, economic instruments and/or government activities would you advocate to stimulate more market growth in the environmental industry?

Thrupp: In California, we need more streamlined and efficient regulatory enforcement from the Water Board and DTSC. Also, more tax incentives for investment in brownfield sites and projects.

EBJ: How do you see climate change issues or policy affecting your business?

Thrupp: Climate Change is not a major impact on our business, however we do see related policy (such as 'green remediation' regulatory initiatives) as a positive impact on our remediation business.

EBJ: What do you think are the key issues facing CEOs today?

Thrupp: Finding talented mid-level (project level) technical talent is a substantial challenge.

EBJ: Has the flow of bid opportunities and proposal activity increased throughout 2014-2015, decreased, or stayed about level? What customer areas are showing most movement?

Thrupp: Bid opportunities and proposal activities increased throughout 2014 and has maintained about the same pace in

2015. However we have seen a particular increase in the number of water resources bid opportunities in 2015, probably due to public sector projects resulting from the drought conditions.

EBJ: How do you choose whether or not to pursue work or make your "bid/no bid" decisions?

Thrupp: We have an "informal" internal process that involves principals and senior subject matter experts.

EBJ: How have bid/proposal win rates trended in recent months, or in 2014 vs. 2015?

Thrupp: Not surprisingly, our win-rates depend on the volume of pursuits. This varies quite widely, depending on work loads, etc. In general, win-rates have improved in 2014 and 2015 because we have been more selective about which public sector opportunities we pursue.

EBJ: Do you have full time business development department, or is the function interspersed with technical and/or billable people?

Thrupp: We have one full time BD person within the company. However BD is also interspersed with technical/billable people. SGI's BD director is also responsible for the company's proposal management process.

KEYS TO SUCCESS

EBJ: What were the keys to success in the 80s?

Thrupp: Figuring out how to operate and execute.

EBJ: What were the keys to success in the 90s?

Thrupp: Managing growth proactively, not reactively

EBJ: What were the keys to success in the 00s?

Thrupp: Differentiating the firms expertise.

EBJ: What were the keys to success in the 10s?

Thrupp: Careful financial management and client care.

EBJ: What will be the keys to success the 20s?

Thrupp: Diversifying services.

PERSONAL OBSERVATIONS

EBJ: How do you feel about the progress (or lack thereof) we have made on environmental issues in the past 40 years or so and the role the environmental industry has played?

Thrupp: I feel the environmental industry in the U.S. has progressed as one would expect a regulatory-driven industry to progress; steady, but certainly not impressively or dramatically (say, in comparison to industries like high technology, telecommunications, etc.).

EBJ: How have the environmental problems you've been asked to solve changed over the years?

Thrupp: They have not changed as much as we would have expected. Change has been relatively slow in the subsurface assessment and remediation sector.

EBJ: What do you feel are the most pressing environmental and social issues today in 2015 and in the longer term out to 2030?

Thrupp: I feel water resources is the most pressing issue in California. Today and longer term.

EBJ: Do you consider yourself a 'socially conscious' consumer?

Thrupp: I consider myself a reasonably 'socially conscious' consumer. For example I do try to limit my 'consumerism' and maximize my personal efficient use of resources and recycling. However I don't purchase predominantly recycled products nor hybrid vehicles, etc.

EBJ: What motivates you most in your work and how does that translate down to your employees and colleagues?

Thrupp: Helping my company grow and create opportunities for employees to grow. □

RINCON CONSULTANTS MAINTAINS SOLID GROWTH WITH CLIENT DIVERSITY AND POSITIVE CORPORATE CULTURE

Rincon Consultants, Inc. is a 'large' small business (SBE) with about 96 employees and gross revenues for 2015 estimated at about \$16.5 million. Rincon provides a broad range of environmental consulting services with revenues roughly split into 40% Natural and Cultural Resources and Permitting; 40% in Environmental Planning and Sustainability, and 20% Environmental Site Assessment and Remediation. Rincon's customer base is diverse and is divided about 60% private and 40% public and the company participates in the following market sectors: Transportation, Water Resources, Land Development, Energy, Utilities, Government Services, and Education. Rincon Consultants was founded in 1994 and Michael Gialketsis is the president of the firm.

EBJ: How has business been in general the past couple of years?

Michael Gialketsis: Business in 2014 and 2015 has been robust in most of our market areas. In prior years business was strong in some market areas but weak in others.

EBJ: Now that the 'Great Recession' is technically over in the U.S., how did the early crisis points and the subsequent economic slowdown affect your business?

Gialketsis: Our business became much stronger as we were forced to focus on where the opportunities were and how we would strategically pursue those opportunities. We navigated the recession very well given our technical, geographic and market sector diversity without layoffs and without missing a semi-annual staff bonus.

EBJ: What sectors did you see demand for environmental services change most in during the recession and then the past couple years?

Gialketsis: During the recession, our climate change (AB 32, Assembly Bill 32 or the Global Warming Solutions Act of 2006), transportation, energy and utility focused markets performed quite well with the State push toward infrastructure improvements, trends toward renewable energy, and climate action planning. Over the past two years, those sectors remained strong as our broader base Land Development and Government Services market areas gained strength.

EBJ: What signs of recovery, have you observed in 2014-2015?

Gialketsis: We observed more transactional work in the Land Development sector, more local and regional planning funding, mostly related to Transportation, Energy, and Water sectors but also long range planning related to transit and rail system transformation, Climate Change and adaptation.

EBJ: Has the lingering malaise in the global economy had any impact on you or your client base?

Gialketsis: Not yet.

EBJ: How about the lowered prices of commodities and oil & gas: What impact has that had on your business and has it changed your approach at all?

Gialketsis: The disruption in the oil and gas market place has actually created more transactional related work, and the O&M related work has not slowed as companies strive to upgrade their aging infrastructure and manage environmental and public health risks.

EBJ: What has been the main thrust of your strategy over the past couple years?

Gialketsis: Strengthen our market diversification, staff professional development and retention and enhancement of core competencies.

EBJ: Where do you see your best growth opportunities: in the short term; and in the long term either by customer, service, by media like air or water?

Gialketsis: In the short term we see strong growth in broad level environmental planning and permitting services and environmental compliance for transportation and water sectors as well as renewable energy. In the long term, climate change adaptation and continued infrastructure rehabilitation should remain strong.

EBJ: What service areas are you looking at diversifying or for developing new business practices?

Gialketsis: Strengthen our geographic foundations and the market sector expertise Statewide (California). We are adding marine resources services as another technical qualification to round out our technical capabilities.

EBJ: Are you seeking to evolve into a more integrated service provider? (i.e., getting into recurring revenue streams and away from event-based business: outsourcing, etc.)

Gialketsis: Not so much. We are providing contract staffing support for local government agencies.

EBJ: What new large contracts of note has your company been involved in the past two years?

Gialketsis: California High Speed Rail (CHSR), On calls with private solar energy companies, on calls with utility, water agency, and public works agency clients, sea level rise land use studies and plan amendments.

EBJ: What have been your most noteworthy projects or business accomplishments?

Gialketsis: Zwieg Group Best Places to Work 2015

EBJ: What growth do you forecast, for your company, over the next 2-3 years?

Gialketsis: 5-7%

EBJ: What growth do you forecast, for your sector of the environmental industry over the next 2-3 years?

Gialketsis: 3-5%

EBJ: What policy initiatives, economic instruments and/or government activities would you advocate to stimulate more market growth in the environmental industry?

Gialketsis: Climate change initiatives, Transit Oriented Development associated with transformation of transportation system centered around CHSR. Water and other infrastructure improvements.

EBJ: How do you see climate change issues or policy affecting your business?

Gialketsis: Strong growth stimulus due to transformation of transportation and land use.

MANAGEMENT & BUSINESS DEVELOPMENT ISSUES

EBJ: What do you think are the key issues facing CEOs today

Gialketsis: Internally it is the complexity and cost of complying with employment regulations, as well as the availability of exceptional staff. Externally it is keeping up with rate of change and managing that adaptation to change.

EBJ: Has the flow of bid opportunities and proposal activity increased throughout 2014-2015, decreased, or stayed about level? What customer areas are showing most movement?

Gialketsis: Increased steadily with land development coming back to life. Transportation opportunities accelerating. Other areas stable or showing steady growth.

EBJ: How do you choose whether or not to pursue work or make your "bid/no bid" decisions?

Gialketsis: We do this carefully based on winning probability and strategic investment in new areas.

EBJ: How have bid/proposal win rates trended in 2014 vs. 2015?

Gialketsis: Steady, our firm has high win rate 40+%

EBJ: Do you have full time business development department, or is the function interspersed with technical people?

Gialketsis: Small BD department geared toward supporting professional efforts.

EBJ: Do you think small or large companies approach business development in fundamentally different ways?

Gialketsis: Yes, smaller companies are more efficient with their resources. Smaller teams accomplish similar results.

EBJ: What were the keys to success in the 80s, 90s, 00s, 10s and in the future?

Gialketsis: To me the keys to success do not change: They are qualifications, high quality work, and a positive company culture.

PERSONAL OBSERVATIONS

EBJ: How do you feel about the progress (or lack thereof) we have made on environmental issues in the past 40 years or so and the role the environmental industry has played?

Gialketsis: Progress in California has been good with the State leading the nation and world in many important areas. Environmental industry has been key in developing awareness and helping to ensure our resources are managed and protected for the future. The lack of attention to infrastructure and statewide energy, water and transportation systems was late to get traction but ahead of many areas of the country. California has had visionary political environmental leadership.

EBJ: How have the environmental problems you've been asked to solve changed over the years? Are they more complex, more geographically dispersed, or involve more stakeholders?

Gialketsis: More public awareness, accountability, and risk exposure. The issues have become more complex, the backdrop more litigious, and more public involvement. While this is a good evolution in general to have more public input, processing a complex project has become very difficult and nearly impossible for some. The game is harder and the team is better.

EBJ: What do you feel are the most pressing environmental and social issues today

in 2015 and in the longer term out to 2030?

Gialketsis: The regulatory and political complexity and the pace at which we can adapt to our aging infrastructure, climate change, and population growth. Vastly improved intergovernmental cooperation is needed. Federal, state and local processes need to be consolidated into a single process that addresses the issues. The laws don't need to be weakened, but the processes need to be refined.

EBJ: Do you consider yourself a 'socially conscious' consumer? (i.e. do you buy organic foods, efficient cars/products, clean energy, recycled products, etc.) Provide some examples.

Gialketsis: Yes. I have roof top solar, a plug in electric vehicle, drought tolerant native landscaping, buy local organic foods, shop locally, don't buy stuff just to have stuff, etc.

EBJ: What motivates you most in your work and how does that translate down to your employees and colleagues?

Gialketsis: The challenge of being a leading firm in California while maintaining a Best Places to Work culture. I am clear that I need their help. The entire team needs to own the culture and shared vision of being the best. □

In the short term we see strong growth in broad level environmental planning and permitting services and environmental compliance for transportation and water sectors as well as renewable energy. In the long term, climate change adaptation and continued infrastructure rehabilitation should remain strong.

MORGAN JOSEPH TRIARTISAN EXPECTS CONTINUED M&A ACTIVITY FROM PRIVATE EQUITY AND STRATEGIC BUYERS

by Stephen Clarke. Clarke is Managing Director at Morgan Joseph TriArtisan LLC, an investment and merchant bank, where he leads the Infrastructure and Environmental Services effort.

The environmental services industry saw strong M&A activity in 2015 from both financial investors and domestic and international strategic buyers.

Private Equity: Although the transaction details were not disclosed, two private equity deals, **Ontario Municipal Employees Retirement System** or OMERS' acquisition of **Environmental Resources Management** from **Charterhouse Capital Partners** and Levine Leichtman's acquisition of Trinity Consultants from Gryphon Investors were rumored to trade at double digit multiples of EBITDA.

Given the attractive operating margins, low capital expenditure requirements and steady earnings streams of both ERM and Trinity, their private equity buyers were

able to use substantial leverage to make these acquisitions.

In other private equity activity, environmental E&C firm **CH2M** received a \$300 million minority investment from alternative asset manager **Apollo Global Management** in May. This transaction was similar to the investment received by **AECOM** from GSO and J.H. Whitney in early-2006 which was followed in short order by an IPO in May 2007. Apollo can affect a CH2M IPO or change of control transaction after five years.

Strategic Acquirers: Strategic players in the space continued to snap up sizeable assets to bolster their environmental offerings, with a flurry of deals announced in October and November, including UK-based **Intertek's** acquisition of testing and inspection firm **Professional Service Industries** from private equity backer **Olympus Partners** for approximately \$330 million and **Westinghouse Electric Company's** acquisition of **CB&I Stone**

& Webster from **The Shaw Group** for approximately \$229 million.

Within one week in November, **Energy Capital Partners** portfolio company **EnergySolutions** announced a deal to sell its nuclear services-focused Projects, Products & Technology division to **WS Atkins** plc for \$318 million and a transaction to acquire radioactive and hazardous waste treatment/disposal firm **Waste Control Specialists** from Texas-based chemicals company **Valhi** for \$367 million. The Westinghouse and EnergySolutions transactions illustrate the ongoing demand for nuclear services providers as former government nuclear sites and commercial nuclear power plants are retired.

With a number of transactions valued in excess of \$300 million and average multiples of EBITDA in the double digits, acquisitions of environmental services companies are proving to be an important component of growth strategies across the industry. This trend will likely continue into 2016 as private equity firms look to establish new platforms and add to existing portfolio companies and strategic buyers seek diversification of services, end markets and geography and to consolidate in the face of increased competition. □

Morgan Joseph TriArtisan: Highlight Environmental Industry Transactions in 2015

Selected Private Equity Deals				
Announced Date	Target	Buyer/Investor	Transaction Size	Deal Type
Jun-15	ERM (Environmental Resources Management)	OMERS	\$1,700 mil	Acquisition
Aug-15	Trinity Consultants	Levine Leichtman Capital Partners	\$350 mil	Acquisition
May-15	CH2M Hill	Apollo Global Management	\$300 mil	Minority Investment
Nov-15	ATC Group Services	Bernhard Capital Partners	\$63 mil	Acquisition
Selected Strategic Deals				
Announced Date	Target	Buyer/Investor	Transaction Size	Deal Type
Nov-15	Waste Control Specialists	EnergySolutions, Inc.	\$367 mil	Acquisition
Oct-15	Professional Service Industries	Intertek Group plc	\$330 mil	Acquisition
Nov-15	EnergySolutions PP&T Division	WS Atkins plc	\$318 mil	Acquisition
Oct-15	CB&I Stone & Webster	Westinghouse Electric Company	\$229 mil	Acquisition

Source: Morgan Joseph TriArtisan LLC, 2015 M&A Roundup

EFCG SEES KEY THEMES DRIVING ROBUST M&A ACTIVITY

By Andrej Avelini, Managing Director, *Environmental Financial Consulting Group*. EFCG (www.efcg.com) is a financial advisory firm that exclusively serves the environmental and infrastructure engineering/consulting (“e/c”) industry. EFCG offers financial and strategic advisory, benchmarking and valuation services, annual CEO (27th year), CFO (17th), CHRO (8th) and CIO (inaugural) conferences, internal ownership transition advice, and buy-side and sell-side M&A services. EFCG has advised on some 140 completed M&A transactions in the e/c industry over the last 25 years. Andrej leads EFCG’s M&A practice, having advised on some 110 of those completed M&A transactions in the e/c industry.

After a record year for M&A in 2014, in which almost \$25 billion of gross revenues were acquired in the Engineering/Consulting business, M&A activity has cooled down a bit in 2015, at least when it comes to headline grabbing transactions. 2014’s high dollar activity was driven by 4 multi-billion dollar transactions, which accounted for \$18 billion in total revenues acquired (AECOM-URS, WSP-PB, AMEC-FW and SNC-Kentz, see chart).

We see continuing robust market activity in 2015, just not any multibillion dollar deals. It appears 2014’s large firm activity was driven mostly by some idiosyncratic or company-specific factors. URS, for instance, was under intense shareholder pressure from an activist investor, while Parsons Brinkerhoff was sold because its parent Balfour Beatty was in trouble and needed cash.

In general, market conditions remain ripe for robust M&A into 2016, and EFCG continues to see strong interest from numerous strategic and financial or private equity buyers and investors. As of the late 2015, we are seeing an imbalance between buyers and sellers, with far more “good” buyers (well-capitalized, well-run, looking for acquisitions for strategic rather than the “financial engineering” reasons) than “good” sellers (firms with consistently strong growth and profitability history and outlook, and with strong leadership). EFCG has more buy-side M&A search assignments than usual, indicating that in a way today is more of a “seller’s market”.

We are seeing CEOs and CFOs of strategic buyers, particularly the larger ones, being more positive about their company’s

prospects for profitability. They also have plenty of capital (many have more cash than debt) but lack internal growth opportunities, and thus are using acquisitions to ameliorate lower internal growth.

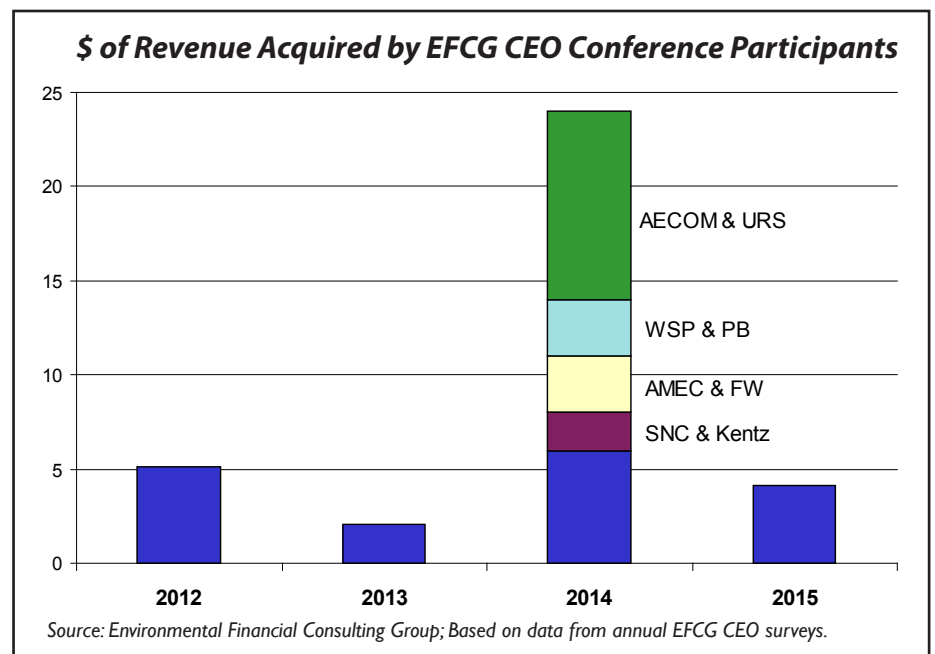
Many of the sizeable e/c firms that had to sell have sold, so the remaining ones are generally better run and would only consider M&A if it significantly “leap-frogs” them over competition and allows them strategically to achieve goals they cannot on their own (usually because they either lack capital or dynamic leadership or both). Furthermore, private equity seems to be aggressively pursuing investments in our industry, valuing firms at the same relative valuation metrics as strategic buyers (sometimes even higher than strategic buyers due to aggressive use of low-cost debt/financial leverage), adding to numerous choices for “good” sellers.

That being said it is fair to characterize 2015’s M&A activity around 4 “themes”. It must be said that as an M&A advisor EFCG’s bias is to focus on deals EFCG advised on since those are the ones we know more about, but below we refer to a few interesting deals we did not advise on as well.

PRIVATE EQUITY INTEREST

There continues to be tremendous interest by Private Equity to invest in our industry. In 2015, notable PE investments include Apollo’s investment in CH2M, OMER’s investment in ERM (on their 4th PE investor), Levine Leichtman’s investment in Trinity (on their 3rd PE), and General Atlantic’s investment in EN Engineering (also on its 3rd PE). Other notable names on the PE-owned list include Trow/EXP, Englobe, MMM (acquired by WSP in 2015), CHA, and Apex (on its 2nd PE).

One of the benefits of PE ownership is the professional capital which provides liquidity for shareholders at fair market value, and growth capital for acquisitions and working capital needs. Further, if the business plan and leadership is supported, PEs have the capital to strengthen the balance sheet, which may help manage the increasing risks e/c firms appear to be taking on projects. PE also provides a way for e/c firms to maintain independence and an entrepreneurial culture, rather than selling to a large strategic buyer, while

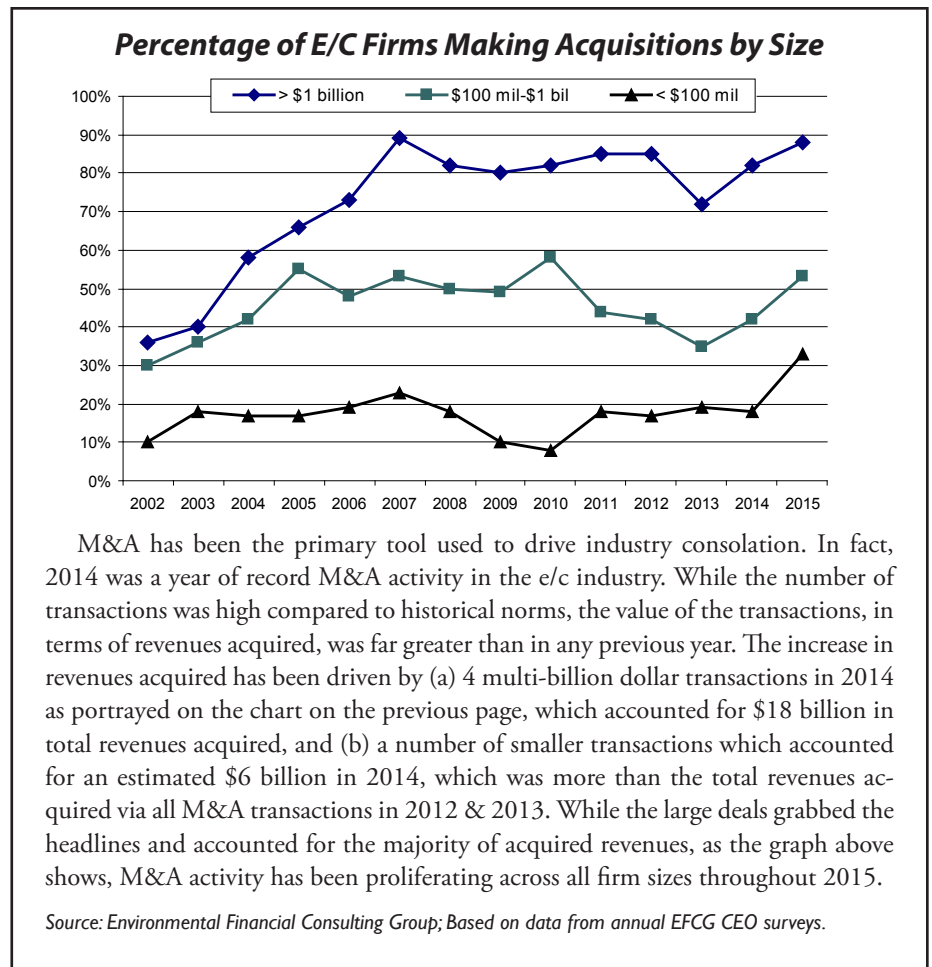


retiring founders / owners at fair market value. However, private equity is not for everyone and oftentimes is culturally not compatible with the less profit-oriented culture of many e/c firms. Not all PE firms are the same (just like not all e/c firms are the same!), but in general we have found e/c firms which lack a profit-oriented culture tend not to be a good fit with private equity.

In the case of CH2M, in June 2015 the firm raised private equity capital to strengthen its balance sheet, following a \$341 million reported loss in 2014, caused primarily by losses on fixed-price EPC power contracts. CH2M decided to exit their power EPC business, and incurred write-downs of goodwill related to prior acquisitions. In light of these events and to improve operating efficiency and profit margins, management implemented a restructuring that is expected to generate annual cost savings of \$150+ million beginning in 2015. CH2M management also decided it was prudent to raise external equity to have additional financial cushion to fund shareholder redemptions, reduce debt and advance their corporate strategy.

Unlike most employee-owned firms who provide stock liquidity once a year and only when employee shareholders leave the firm (due to death, disability, firing or retirement—mostly unhappy circumstances!), CH2M provides an internal market for its stock, so employees can buy and sell shares from one another each quarter for ANY reason, at a price determined by CH2M's Board, based on a formula and in conjunction with quarterly "fair market value" assessments provided by an outside appraiser. (By way of disclosure, EFCG has been CH2M's outside appraiser for the past 18 years, and helped create its internal market process.) The company has historically stepped in and "balanced" or "cleared" its internal market when there were more individual sellers than buyers, which has generally been the case in recent years, as the baby boomer generation began to retire.

To deal with this situation, CH2M raised \$300 million in convertible preferred equity with a 5% PIK (paid-in-kind) dividend from Apollo Global Manage-



ment (Apollo), one of the world's largest and best-known private equity firms. In return, Apollo will initially receive a ~15% stake in the company.

Apollo paid a 30% premium to the internally-traded share price, valuing CH2M's equity at roughly \$2.0 billion, which implies an "aggregate" or "enterprise" value of \$2.4 billion (equity value + net debt of \$400 million). We estimate Apollo's investment values CH2M's enterprise value at roughly 10x the normalized run rate of EBITDA, which is within the 8x-12x EBITDA range that the largest and most prestigious e/c firms have been priced at in both the M&A and public markets. During its capital raise process, CH2M received strong interest and attractive offers from a variety of potential investors.

Despite the minority investment, Apollo, as the largest single shareholder, will have consent rights over certain of the company's strategic decisions. CH2M is required to seek Apollo's approval to take on certain fixed-price design-build or

EPC contracts, enter new business lines, make acquisitions or form joint ventures. Moreover, Apollo has the right to exit the investment in 5 years, which would most likely involve a refinancing of the private equity portion of its capital (such as ERM has now done 4 times in 15 years); it could also include an IPO, a public or private debt offering, merger or other form of recapitalization.

CH2M has the option of repurchasing Apollo's shares after 3 years, but that will be difficult since management anticipates Apollo will own 20-25% of the company on a fully diluted basis by then. (While Apollo paid a 30% premium, the combination of the 5% annual PIK dividend, along with CH2M's expected stock repurchases, will likely increase Apollo's ownership percentage over the next few years.) On the other hand, increasing profitability and growth, facilitated by this capital raise, would have the potential to provide extra capital to repurchase stock as well as to open the possibility of other forms of financing.

In the case of ERM, **OMERS Private Equity**, the PE arm of Ontario's Municipal Employees Retirement System, acquired ERM from **Charterhouse Capital** for an enterprise value of \$1.7 billion. With gross revenues around \$1 billion,

ERM is one of the largest and most successful global environmental consulting firms, serving mostly Fortune 500 clients. We believe ERM is also the most valuable PE-owned e/c firm, and they continue to thrive under PE-ownership. Charterhouse purchased ERM for an enterprise value of \$950 million in 2011, and is estimated to have made 2.4x their equity investment. ERM is now on their 4th private equity investor, having been PE-owned since 2001, when **3i** financed a management buyout of ERM's retiring partners, which enabled the non-retiring partners to maintain significant ownership and continue to lead the company, and provided capital for internal and acquisitive growth.

In other words, ERM utilizes a "hybrid" capital structure, which allows for ownership transition at fair market value (which satisfies retiring shareholders), while simultaneously enabling the next generation of leaders to maintain operating control and finance growth. While PE firms typically want management to have some "skin in the game", ERM's partners own a greater percentage of the company than is typical.

As of July, 2011 when Charterhouse acquired ERM, ERM's 490 partners owned 45% of the firm. One of the challenges of this model is that ERM must be recapitalized every few years, as the PE sponsor exits the investment. Certainly that is a challenge, but it may be easier to facilitate a PE change every few years, than to facilitate ownership transition without adequate capital.

While ERM may eventually go public, given the lower cost of public equity capital, the current hybrid capital model is proving very effective and lucrative for both ERM and its PE sponsors. ERM has a few attributes that make it particularly well-suited for a PE investor, including: moderate internal growth (easier to finance; supported by an acquisition program), consistent, very high profitability,

high-end business niche, entrepreneurial culture and great client diversification, which enables ERM to better withstand economic cycles.

ALTERNATIVE OR INTEGRATED DELIVERY

Integrated Delivery has become a key driver as clients and firms move away from the traditional time & materials contracts that engineering firms mostly grew up on. As integrated delivery methods, including design-build and public-private partnerships (P3), continue to gain popularity, many firms believe that greater size is necessary to compete effectively for the largest contracts. However, while these delivery models proliferate, there has been a mixed reaction. Some firms believe that providing full service solutions is critical, while others feel that there will always be sufficient demand for the highest quality engineering design services. Further, a number of traditional engineering firms that have recently taken on fixed price construction risk have run into firm-threatening difficulties when projects went over budget. There appear to be significant differences in both risk profile and culture between engineering and construction firms in the design-build world, and it can be difficult to effectively integrate the two.

HDR's acquisition of **Infrastructure Corporation of America (ICA)** that closed in January 2015 is an example of the use of M&A to further a firm's capabilities in alternative delivery. O&M/Asset Management capability is part of alternative project delivery life-cycle and ICA brought this capability to HDR. Another example is the sale of \$60-million revenue **Fay Spofford & Thorndike (FST)** to **Stantec** announced in August 2015 because one of the drivers was that FST needed to be bigger to better position themselves for P3 work in its home market of Massachusetts. (EFCG advised on both these deals).

In the case of HDR, ICA was a \$130 million revenue firm, and a key player behind the move to deliver transportation operations & maintenance (O&M) services by outsourcing what was traditionally performed in-house, mostly by state Departments of Transportation (DOT's).

Much like engineering/design services which became outsourced by DOT's some 40-50 years ago,

O&M services began to be outsourced some 20 years ago, but typically only to small local contractors. ICA's value proposition is to provide a comprehensive "asset management" solution for public agencies with long-term contracts (e.g. 5-10 years or longer), lump sum/performance-based terms (providing a more certain cost and performance outcome), bundled services (not just single activity, but the entire complement of O&M services) from a larger, more sophisticated, fully bonded and capable service provider (none really existed prior to ICA). Though its acquisition of **Florence & Hutcheson** in 2010, ICA strengthened its engineering services.

By acquiring ICA, HDR, which has always been known for excellent engineering capabilities, strengthened their O&M and asset management offerings, which should help them serve their clients throughout the entire project life-cycle. Further, this acquisition will give HDR a stronger presence in the Southeast United States.

CORPORATE DIVESTITURE

Corporate Divestitures of strategically non-fitting units accelerated in 2015. Notable transactions were **Cardno's** divestiture of **ATC**, **Willbros** divestiture of their professional services pipeline business to **TRC** and other Texas e/c business to **Stantec**, **EnergySolutions'** divestiture of federal nuclear engineering assets to **Atkins**, **CBI's** divestiture of certain commercial nuclear assets from the Shaw acquisition.

We see more of those types of divestiture coming in 2016. In some ways, given the large amount of M&A in the e/c industry, it is not surprising to see that some pieces of the businesses being acquired, particularly in some of the largest deals, do not fit the acquirer's business, or do not fit in an efficient manner, one conducive to the acquirer's evolving strategic priorities. One way to redeploy capital away from less fitting business units towards a growth strategy (acquisitive or organic) is to divest such a business unit. Sometimes, divestiture are also a way for a troubled parent to gain some much needed liquidity.

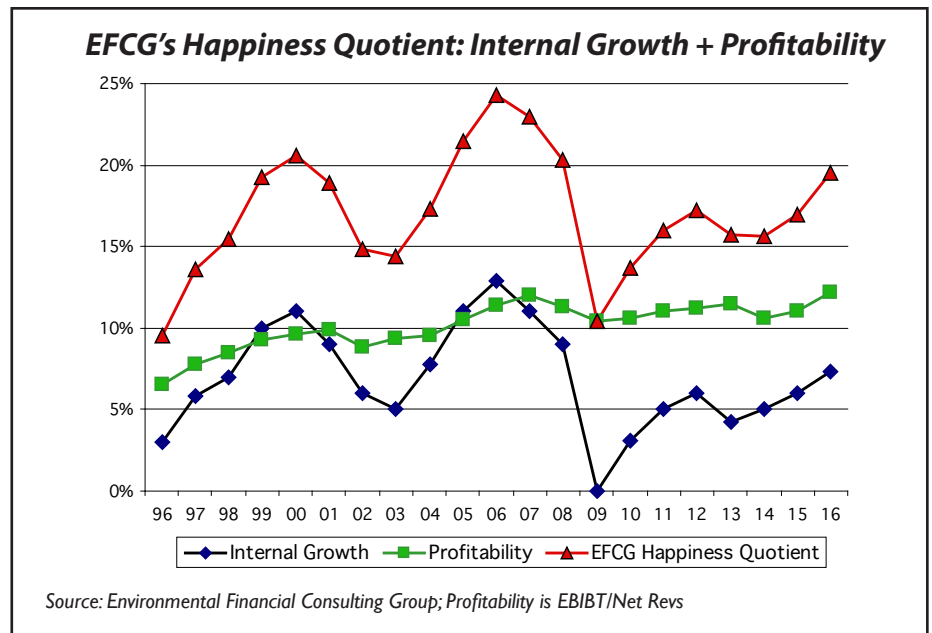
GLOBAL PLATFORM DEALS

Tetra Tech's pending acquisition of Coffey in Australia and Ramboll's acquisition of Environ are prime examples of a trend toward cross-border, globalization and international "platform" deals: Firms are increasingly looking for international platform opportunities to accelerate expansion into new geographies. This enables firms to better satisfy clients' needs, and achieve greater diversification. In many instances, these acquisitions open the door to cross-selling opportunities, as both firms can leverage their capabilities in new locations.

In the case of Ramboll's acquisition of Environ as their North American platform, \$1-billion Ramboll, a foundation-owned, mostly Scandinavian infrastructure firm, engaged EFCG to help them make a "platform" acquisition in North America to further globalize its business. At the time, Ramboll did not have any meaningful business in North America. Environ, a \$300 million+ revenue environmental consulting firm, was not "for sale"; in fact, they were a fiercely independent, very profitable and well-run business, with no need to sell. However, Ramboll provided some unique opportunities for Environ.

Environ will have a significant amount of management autonomy and continued leadership opportunity in North America. Further, we believe they will lead Ramboll's worldwide environmental consulting business, given their prowess as a high-end environmental consulting firm, with a third of their business outside the U.S. Second, culturally, this was a very good match; Ramboll's Scandinavian approach to business and culture is a good match with the U.S. Third, Environ is committed to employee/private ownership and the related cultural benefits of such ownership (e.g. employee owned firms have much lower voluntary turnover than publicly traded firms—on the other hand, public companies tend to have better access to lower cost capital).

Finally, we think Environ also realized the importance of being a global player with the necessary size to compete effectively around the world in a rapidly consolidating industry, so being part of



Ramboll gets them there immediately (vs. a standalone build strategy which takes many years, lots of capital and risk taking).

A WORD ON M&A VALUATIONS

EFCG is frequently asked about valuation multiples and here is our current view on the subject. EBITDA (not EBIT) is becoming the Key Earnings Metric. While in the past we have focused on EBIT (Earnings Before Interest and Tax) as the most appropriate earnings metric used in M&A valuations, we now find that EBITDA (Earnings Before Interest, Tax, Depreciation and Amortization) is the key measure used by the more sophisticated buyers and investors.

Current EBITDA Multiple Range: Looking at the last 50 or so significant M&A transactions in the e/c industry over the last 3 years, we see a range of Aggregate or Enterprise Value to Adjusted EBITDA of 4x-12x. We define Aggregate or Enterprise Value as what a buyer pays for the stock or assets acquired, plus the Net Debt being acquired or paid off by the buyer. Net Debt is generally defined as Debt less any "excess" cash (or cash equivalents) not needed in the business. By Adjusted EBITDA we mean a "run-rate" of EBITDA (usually a combination of last completed year and next projected year, with an eye on the trend for the past 3-5 years and with consideration of likely earnings

growth over next 3-5 years) adjusted, up or down, for any "extraordinary" or "non-recurring" or "one-time" income/expenses. Adjusted EBITDA is also after "normalized" bonus expense (i.e. after necessary on-going performance bonuses buyer will likely need to continue to pay post-deal, but before any owners' bonuses previously paid as a result of ownership rather than performance).

Larger Firms Valued More Highly: 4x-12x Adjusted Run-Rate EBITDA is a pretty wide range. There are many factors influencing where in that range an e/c firm might be valued, but one of the key differentiators is the size of the seller, with smaller sellers being at the lower end of this range, while larger sellers tend to be towards the higher end, all else being equal. Most deals (which tend to be smaller) have been in the 4x - 8x range, although some of the largest and most desirable acquisitions have gone for 8x - 12x. Of course all else is not equal, so in addition to size, some of the more important parameters are: earnings growth expectations and historical trend; quality, age and depth of management; market sector; geography; consistency of financial performance; prospective seller's viability of alternatives to a sale; and finding the right buyer with the best fit and potential synergies. □

INTERESTING DEALS IN 2015 HIGHLIGHT SOME KEY M&A TRENDS

by Steve Guido, *Rusk O'Brien Gido + Partners*. *ROG+ Partners has worked on business planning, valuation, ownership planning, and M&A engagements with almost 1,000 firms in the architecture, engineering, planning, and environmental consulting industries. Steve Gido leads ROG+ Partners' merger and acquisition practice and specializes in corporate financial advisory services including mergers and acquisitions, business valuations, ownership transition plans, and strategic planning*

While 2015 will go down as an active year in A/E, planning and environmental industry M&A, I selected three notable deals that illustrate key trends:

- Apollo's \$300 million stake in CH2M (private equity/outside capital transaction)
- Intertek's \$330 million acquisition of PSI (large-scale cross border deal)
- TTG's merger with KJWW (true merger of U.S. mid-size engineering players for scale and national client reach).

APOLLO GLOBAL MANAGEMENT'S \$300 MILLION STAKE IN CH2M – MAY 2015

After a turbulent two year period that ushered in a new organizational restructuring with widespread layoffs, a new CEO and executive team, and a fresh corporate logo, CH2M added one more endeavor by taking a minority investment from the New York private equity firm **Apollo Global Management**. With rumors circulating CH2M was facing cash flow issues, Apollo acquired \$200 million in convertible preferred stock in the spring and would purchase an additional \$100 million within a year. Overall, the investment values CH2M at \$2 billion and the company indicated it would use the proceeds for growth strategies and to pay down debt. CH2M generates annual revenues of approximately \$5.5 billion. Apollo has over \$160 billion worth of assets under management.

"This investment will add to our financial strength and is the right next step toward spurring CH2M's continued growth," said CH2M Chairman and Chief Executive Jacques Hinman in the May press

release. "There is an enormous and expanding need for the work that CH2M does so well -- solving some of the world's toughest infrastructure and natural resource challenges. The financial and strategic benefits from Apollo's investment and partnership will help us accelerate our growth, deepen our partnership with clients, push the limits on innovation, increase opportunities for our employees, and provide additional liquidity to our shareholders. This transaction will also allow us to consider innovative funding solutions to help our public sector clients meet their growing infrastructure needs."

In addition, Apollo obtained two seats on the CH2M board out of six independent seats, with company employees holding the other seven. There is speculation the Apollo transaction could lead to additional acquisitions, as CH2M keeps pace with an active stream of global mega mergers such as URS-AECOM and AMEC-Foster Wheeler, in addition to perhaps an initial public offering (IPO).

The Apollo partnership also reflects the increased interest and activism of private equity involvement in the consulting engineering and environmental industry, as many mid-size and large organizations assess their financial and strategic alternatives to better compete in an ever-evolving landscape.

INTERTEK'S \$330 MILLION ACQUISITION OF PSI

In one of the year's most intriguing cross border deals, U.K.-based **Intertek**, a publicly-traded testing, inspection and certification company acquired Illinois-based **Professional Services Industries (PSI)** for \$330 million, or 7.6 times adjusted EBITDA. PSI had revenue of \$254 million with

2,400 staff across 87 locations. PSI was majority owned by Connecticut private equity firm **Olympus Partners**, who had invested more than \$50 million in 2005 to acquire PSI from Boston-based **Bain Capital**. PSI offers construction testing, environmental consulting and geotechnical engineering services for buildings, factories, offices, hospitals, and structures including bridges and roads, and also generates approximately 25% of its business from non-destructive testing (NDT) of oil and gas pipelines.

Prior to the PSI combination, Intertek had gained a sizable presence in the United States with its 2013 purchase of **Architectural Testing Inc. (ATI)**, one of the largest building products testing and certification companies in North America.

Intertek offered that the combination of its building business with PSI's construction portfolio would create an industry leading testing and assurance "one-stop-shop" service offering.

The purchase and integration remains a formidable test for new Intertek CEO André Lacroix, who joined in May from Inchcape Group, the European car retailer. While announcing that the deal will increase Intertek's earnings per share in the first full year after acquisition and contribute meaningfully to future margins, the key will be to fully leverage the synergies and scalability of their combined testing capabilities globally.

KJWW ENGINEERING AND TTG ENGINEERS MERGER

This fall, Illinois-based **KJWW Engineering** merged with California-based **TTG Engineers** to create a nationwide building organization to leverage their similar sizes, capabilities and market strategies. Combined consulting and engineering services include mechanical, electrical, plumbing, fire protection, structural, civil, technology, bridge, acoustics, medical equipment planning, architectural lighting, energy modeling, sustainability and LEED design, construction management and commissioning. The rationale of the transformational combination, with KJWW's 500 employees and TTG's 360 staff, is to leverage its scale and national

reach among both firms' healthcare, higher education, government, entertainment, industrial, and transportation markets.

TTG and KJWW, founded in 1955 and 1961, respectively, combine to bring 114 years of experience, along with many award-winning projects and "firsts" in sustainable design, such as the world's largest lake-coupled geothermal system, the largest LEED Platinum office building in the U.S., the first LEED Platinum data center in the U.S., the first LEED Platinum university building in Illinois, and the first GSA-owned LEED Platinum building in the nation.

The merged firm will have close to 900 employees working in 25 national and five international locations. Both companies generated approximately \$40-50 million each in annual revenue and will continue to operate under their own brand names, but within a newly created holding company with common management. The firm is led by seasoned industry veterans Paul VanDuyne and Zareh Astrouian. KJMM's VanDuyne will be CEO of the holding company and TTG's Astrouian its Chairman.

While many have been predicting more "mergers of equals" among mid-sized consulting engineering firms as the need for size and geographic presence grow, the KJWW-TMAD transaction, along with the 2015 merger of New York structural engineering titans **Thornton Tomasetti** and **Weidlinger Associates**, may be a harbinger of future combinations. ■

While many have been predicting more "mergers of equals" among mid-sized consulting engineering firms as the need for size and geographic presence grow, the KJWW-TMAD transaction may be a harbinger of the future.

BGL SEES BROAD INTEREST FROM PE FIRMS

by Effram Kaplan, Brown Gibbons Lang & Company. BGL is an independent investment bank serving the middle market, specializing in mergers and acquisitions, advisory services, debt and equity placements, financial restructuring advice, and valuations and fairness opinions. BGL has global industry teams in Consumer Products & Retail Services, Environmental & Energy Services, Healthcare & Life Sciences, Human Capital Management Outsourcing, Industrials, and Real Estate. BGL has offices in Chicago and Cleveland and real estate offices in Chicago, Cleveland, Irvine, and San Antonio, in addition to Global M&A partner offices in more than 50 countries. As Group Head, Effram Kaplan oversees BGL's Environmental & Energy Services practice which serves public and private industry, including the private equity marketplace, public and privately held companies, and credit institutions. The practice is active in solid waste, special waste and industrial services, environmental engineering and consulting, waste-to-energy & renewables, and energy services.

Middle market merger and acquisition activity (\$25 to \$500 million in enterprise value) has continued to increase year-over-year, with deal volume growing 10.4% in the last twelve months ended Q3 2015 compared to the last twelve months ended Q3 2014. M&A activity within the environmental services industry remains strong, with deal volume on pace to surpass 2014 levels.

The environmental services sector is benefiting from strong secular growth underpinned by a favorable regulatory climate, aging infrastructure, sustainability initiatives, and rapidly developing energy market. Such growth along with the essential nature of environmental services and the entrenched customer relationships they create are pillars of platform businesses that private equity firms typically invest in, making the sector highly attractive to a large segment of the private equity community. Further, investors see safety in recurring revenue and high free cash flow conversion characteristics of many business models, with the highly fragmented nature of the sector supporting private equity buy-and-build strategies which enhance value creation. Deal activity is supported by a robust middle market lending environment and broad investor appetite that spans all environmental sectors.

The three transactions discussed below illustrate that private equity interest in the environmental services industry spans multiple subsectors and company size parameters. Liquidity and growth capital is readily available for market leaders in various niches, both large and small.

PRITZKER GROUP ACQUIRES ENTACT (JUNE 2015)

In June 2015, **Pritzker Group** acquired **ENTACT**, a leading provider of environmental and geotechnical construction solutions to private industry in the United States, Canada, Mexico, Puerto Rico, and internationally for \$210 million. ENTACT is ranked number 57 on ENR's 2015 "Top 200 Environmental Firms" which ranks firms by revenue, climbing six spots from 2014. The combined revenue of the list fell by 4.3% to \$51.4 billion under pressure from uncertain global markets and the prior catalysts of surging oil markets and overseas growth forced domestic revenue for listed firms down 3.9%.

ENTACT is a market leader in each industry it serves, continually being awarded alliance contracts or MSA's with major companies, largely accredited to its long history of safety, technical excellence, and field expertise. Additionally, ENTACT often executes large-scale projects, usually incorporating multiple components of its service offering.

"ENTACT is a proven leader in the most challenging areas of the remediation industry and has consistently delivered the highest standards of excellence to its customers" said J.B. Pritzker, managing director of Pritzker Group. ENTACT's management will remain a large shareholder, continue to lead the company, and serve on its board of directors. "Our permanent, proprietary capital base will support ENTACT's world-class team and provide them with the resources needed for their

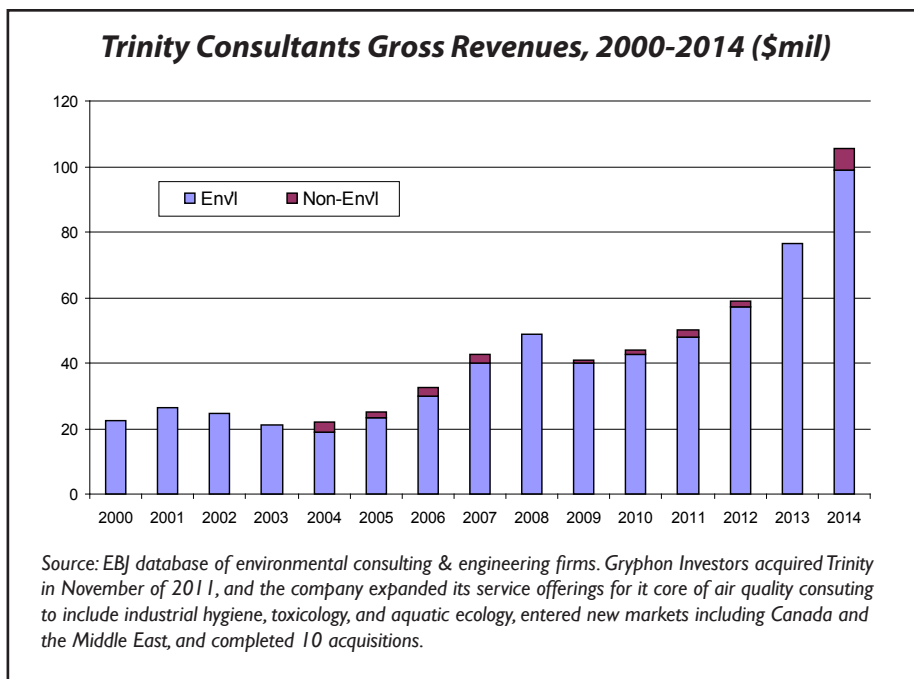
continued growth,” said David Rosen, Pritzker Group Private Capital investment partner. “This is Pritzker Group’s first acquisition in the environmental services industry and we expect to remain active investors in the sector.”

LEVINE LEICHTMAN CAPITAL PARTNERS ACQUIRES TRINITY CONSULTANTS (SEPT. 2015)

In September 2015, **Levine Leichtman Capital Partners (LLCP)** acquired **Trinity Consultants** from **Gryphon Investors** for \$388 million. Trinity Consultants is an environmental consulting company that specializes in industrial air quality issues for clients in a wide range of industries around the world. Trinity employs over 450 billable consultants across 48 offices worldwide. Trinity’s management team will retain significant ownership of the company, and continue to run the business.

Trinity’s service offering is based around critical regulatory-driven permitting and compliance needs, as well as broader sustainability goals including permitting, dispersion modeling, and compliance auditing. Further, Trinity provides environmental, health, and safety training staff services, EH&S information management systems implementation, and technology solutions for modeling analyses.

Lauren Leichtman, co-founder and CEO of LLCPC commented: “We are excited to partner with the Trinity management team who have led the tremendous growth



of Trinity and established it as the leading brand in air quality consulting services across the country. Having followed Trinity for several years, we see our new partnership as a unique opportunity to work with a proven leadership team to continue executing their business plan over the long run.” Trinity ranks 78th on ENR’s 2015 “Top 200 Environmental Firms”, climbing 16 spots from 2014, seeing exceptional growth in an industry experiencing slower growth due to uncertainty and oil trends.

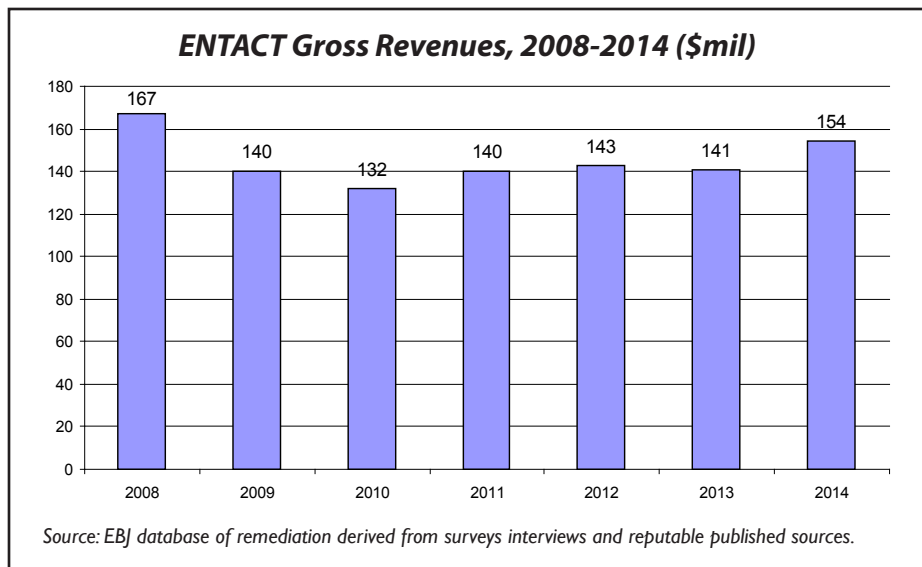
ARES MANAGEMENT AND HARVEST PARTNERS ACQUIRE VALET WASTE (SEPT. 2015)

Ares Management and Harvest Part-

ners have acquired **Valet Waste**, a leading national provider of value-added amenity services to the multifamily housing industry, from **New Mountain Capital** for an undisclosed sum. Valet provides doorstep waste and recycling collection services for more than 400 management companies and owners, servicing more than 665,000 units across 34 states, and also offers complimentary services, including apartment cleaning, grounds keeping, pool furniture reset, and other maintenance services.

“We are delighted to join Ares and the senior management team as long-term investors in the company,” said Michael DeFlorio, Senior Managing Director of Harvest Partners. “Shawn and his team have built a truly unique business that provides exceptional value to customers and residents. We are excited to invest alongside this first class team to build upon Valet Waste’s leadership position in the market and expand services more broadly across the multifamily housing industry.”

“Valet Waste is a leader in its industry, with a longstanding track record of delivering high-quality service to its customers and providing a top-rated amenity to residents. We are excited to partner with the Valet Waste management team and look forward to supporting the company in its next phase of growth.” said Matt Cwiernia, Partner in the Private Equity Group of Ares Management. □



AMEC FOSTER WHEELER SEES SIGNIFICANT GROWTH IN GOVERNMENT SERVICES SECTOR AND COAL COMBUSTION RESIDUALS BUSINESS

Amec Foster Wheeler is a British multinational consultancy, engineering and project management company headquartered in London, United Kingdom, with pro-forma 2014 annualised scope revenues of £5.5 billion and over 40,000 employees in more than 55 countries worldwide. Amec Foster Wheeler offers consultancy, engineering, project management, operations and construction services, project delivery and specialized power equipment services worldwide to customers in the oil & gas, clean energy, environment & infrastructure (E&I) and mining markets. With a history of over 150 years through its various corporate predecessor entities, Amec Foster Wheeler was created on November 13, 2014, through the acquisition of the Foster Wheeler Corporation by the British company AMEC. Amec Foster Wheeler's customers, in both the private and public sector, are among the world's biggest and best in their fields: BP, Shell, BR Petrobras, KNPC, Ontario Power Generation, GDF Suez, Semptra, ExxonMobil, Dow, Ineos Bio, EDF, Hyundai, Ministry of Transportation, Rio Tinto, Northumbrian Water, Codelco, Chevron, K+S, Saudi Aramco, Petronas, Pemex, Marubeni Corporation, Duke Energy, to name a few.

Ann Massey is President Business Development, Global E&I Markets at Amec Foster Wheeler. Ann has 30+ years of experience in project, program, operations and business development in the engineering construction and environmental markets. Ann previously was CEO of MACTEC, a leading US engineering and environmental services company, from May 2008 until June 2011, when MACTEC was acquired by AMEC. Since joining Amec Foster Wheeler, Ann has focused her efforts entirely on building a strong customer focused sector team within E&I globally. Ann spent the first eight years of her career as an onsite petroleum geologist. When the price of oil hit \$20/barrel, like many other geologists at the time, she decided to go back to school and get an MBA. Upon graduation, she changed directions and moved into the environmental field by taking on the role of project manager with business development responsibilities. Her career path since then has been one of management. Ann has a BS in Geology and a MBA from Tennessee Tech University. Working in both geology and engineering services, she is an excellent role model for professional women and is a frequent speaker to professional organizations on issues surrounding women in business and engineering.

EBJ: What is the ownership structure for Amec Foster Wheeler?

Massey: Amec Foster Wheeler shares are publicly traded on the London Stock Exchange and the New York Stock Exchange, where the company is listed in the Oil Equipment and Services sector (AMFW).

EBJ: Is Amec Foster Wheeler's environment & infrastructure market positioned on the overall corporate chart for Amec Foster Wheeler, and if so, where on the chart? How does the environment and infrastructure line fit into the overall organization, especially as it goes out to the marketplace? Around services, or markets/client sectors?

Massey: Amec Foster Wheeler is struc-

tured around four business units and four markets. The business units comprise three regions (Asia, Middle East, Africa & Southern Europe, Americas, and Northern Europe & CIS), and the Global Power Group. The four markets include: Environment & Infrastructure, Oil & Gas, Mining, and Clean Energy. Within the E&I market, we are focused on four sectors: Water, Transportation & Infrastructure, Government and Industrial/Pharma.

EBJ: How many employees are specifically dedicated to environment & infrastructure work at Amec Foster Wheeler, and do you differentiate between environmental work and infrastructure work?

Massey: The E&I market accounts for 10% of overall revenues at Amec Foster

Wheeler, with approximately 7000 employees across a network of approximately 230 offices dedicated to E&I work. We do not distinguish between environmental and infrastructure work, with respect to sales, revenues, number of employees, etc.

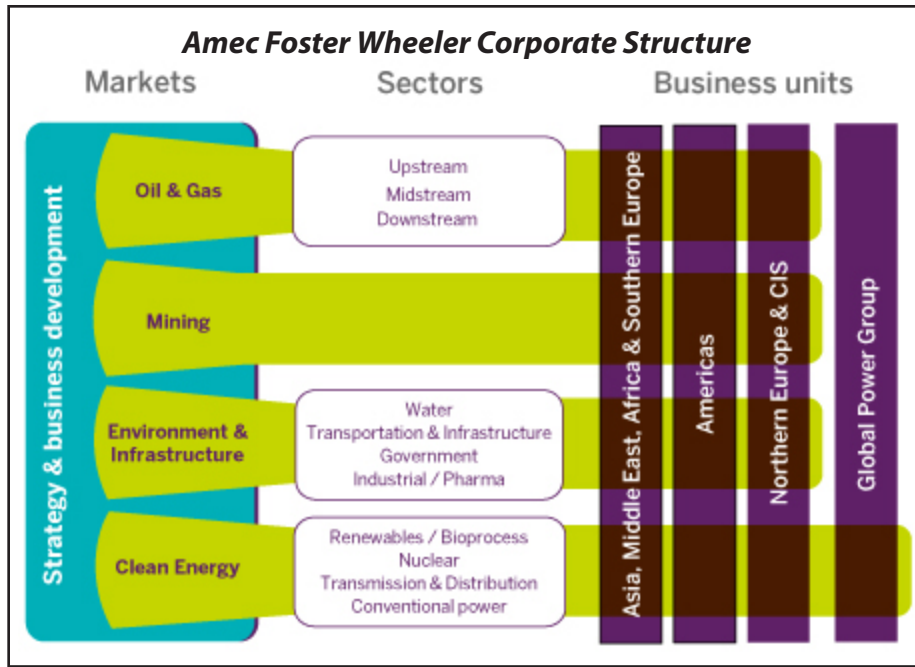
EBJ: Why does the CEO of Amec Foster Wheeler consider E&I to be a leading market for the company overall? Would you say that your environment & infrastructure services line gets your foot in the door for other types of work?

Massey: Our Chief Executive has often referred to the E&I market as the "headlights" for the company, leading to expanded business for the company's other market sectors. Unlike many of our competitors, we no longer focus on selling a defined set of services to individual clients within limited, pre-defined geographies.

Our priority is to understand our customers' toughest challenges, then collaborate and integrate across the company to create a solution offering delivered wherever in the world it is needed. With this approach, we have the ability to "pull-through" other Amec Foster Wheeler business units by virtue of our relationships and/or our early participation on our customers' projects. For example, we might be asked to do the front-end EIS or other site assessment/permitting for a project that is not yet publicly known. So, our environmental work provides early intelligence of great value to our other business units, which may then be able to successfully market their services to that client and that specific facility or asset.

EBJ: You mentioned a November 2014 reorganization adding a geographic-based focus to the overall markets-based approach. What are the main geographical areas and countries of interest, and where is the highest growth internationally occurring? What factors are driving international business and what are the prospects for future growth internationally?

Massey: 85% of our E&I business is derived from the Americas region (primarily United States and Canada, with a smaller amount coming from Latin America: Peru, Brazil, and Mexico), with the government sector driving close to 30% of the Ameri-



cas business. The Americas will continue to be our focus geographically going forward.

Moving forward, we see significant growth opportunity in all geographic areas, but in particular we are focusing on expanding growth in Asia, the Middle East & Africa. The growing populations in those regions have resulted in increasing demand for natural resources and supporting infrastructure. More specifically, water quality and scarcity -- both considered major challenges for global economic growth -- will continue to drive the water sector. Also, our Transportation & Infrastructure sector will continue to be driven by Public-Private Partnerships (PPP) projects as governments seek creative means to meet both aging infrastructure and new build needs. A strong resurgence in manufacturing and process sectors is driving the Industrial/Commercial sector.

EBJ: What are your core sectors within the E&I market, and can you provide a percentage breakdown between these sectors? Which of these sectors are growing, declining, or staying the same?

Massey: The E&I market is focused on four core sectors: Government Services, Industrial/Pharma, Transportation & Infrastructure, and Water. Government Services accounts for the largest percentage of our sales, followed by the industrial/pharmaceutical sector. In terms of sales this year, we have seen greater than 7% growth

in all of our core sectors. Sales in our Government Services sector are up 30-40% globally from last year. We expect continued growth in Government Services in the US and in developing countries. Our current relative breakdown percentage among the sectors is the following:

Government Services: 40%

Industrial/Pharmaceutical: 30%

Transportation & Infrastructure: 20%

Water (direct with municipalities): 10%

EBJ: What is the approximate split between your government and private sector business? Have you seen any shifts in that balance in recent years? And within the government sector, what is the breakdown between your federal government business and state/local government business?

Massey: Slightly more than half our business is government related and the balance has been increasing over the last few years. I should explain that our Transportation & Infrastructure and Water sectors are predominantly government-related business.

With respect to our government sector work, we don't break it down between Federal and state/local. The majority of our government sector work is with the Federal government. Most of our state/local government work flows into other sectors, such as the Transportation & Infrastruc-

ture and Water sectors.

EBJ: What is driving the growth in your government sector business?

Massey: We are reaping the rewards from instituting over the past three years a highly-focused long term strategy toward developing and keeping new government business. This strategy includes being much more selective in choosing the right teaming partners, and putting together much improved proposals for government work. As a result, we are seeing significant increases in government business across all US government agencies, including the US Air Force, Navy, Army Corps of Engineers, US Civilian Agencies and in addition, the Canadian Government.

EBJ: What is your marketing strategy at Amec Foster Wheeler? How do you position yourselves to get new business?

Massey: Our vision is to be the most trusted partner for our customers by consistently delivering excellence -- bringing together the knowledge, expertise and skills of our people from across our global network. We bring our vision to life by developing strong, long-term relationships with customers, staying focused on delivering excellence in the markets we serve and developing our people to achieve their full potential.

EBJ: How do you get paid (i.e., contracting vehicle—time and materials, cost-plus, fixed-price, etc.), and what is the approximate breakdown in which contracting vehicle is used?

Massey: We utilize all contracting vehicles mentioned above to receive payment for our services. A majority of our work is under time and materials contracts and the smallest percentage is under cost-plus.

EBJ: How has your C&E work changed over the past year?

Massey: In general, the consulting and engineering market is impacted by changing economic, financial and regulatory drivers. Over the past year, we have continued to see extreme pricing pressures, especially in the natural resources and larger industrial markets, as a result of market conditions. In addition, similar extreme pricing pressures have occurred in

our Canadian operations due to the overall rapid decline in a largely natural resources-based economy. Like us, our competitors respond quickly as the pricing structures change, and we have found ourselves surprised at times by our competitors' proposals for work for these industries. For example, Amec Foster Wheeler recently submitted what the company believed to be a very competitive bid, and was surprised by another bid that came in with multipliers 30% lower than in our bid.

The longer term challenge with the current environment is that even when the economic/financial situation improves, it will be very difficult to recover the multipliers that existed prior to the industry downturn.

EBJ: How has your C&E work changed over the past 5-10 years?

Massey: In general, over the past 5-10 years, we have seen much less regulatory-driven demand for our work. The pressures on the regulated community from regulators are not as significant as they were during the environmental regulatory heyday of the 1980s-1990s.

Instead, we have seen demand being driven in large part by the larger companies seeking to reduce their potential liabilities – i.e., get them off their books. The Fortune 200 companies that make up a large percentage of our client base have been working diligently to reduce their environmental liabilities, and this has been true even during economic downturns. These larger companies have been planning and budgeting for their environmental spending much more effectively and with a longer-term focus. More money has been specifically earmarked in their budgets for environmental work. Economic pressures may force some customers to at times slow their environmental spending, but the work still continues at significant levels since it is budgeted over a longer period and for economic reasons, rather than primarily in response to regulatory pressures. Most of these larger client companies are also trying to be good corporate citizens and do the right thing when it comes to their environmental responsibilities.

EBJ: Apart from the economic and finan-

cial demand drivers you discuss above, please discuss any new and changing regulatory demand drivers for your business?

Massey: New and revised regulatory policies frequently refocus priorities for companies relative to environmental liabilities. EPA's new Disposal of Coal Combustion Residuals (CCR) from Electric Utilities rule (coal ash disposal or CCR Rule) and anticipated regulations for managing emerging contaminants are driving client companies to determine potential liabilities in these areas. EPA's new CCR Rule, for example, has compelled energy companies to seek technical support to close ash ponds and change residual management methods.

Helping clients satisfy their regulatory requirements under this new rule has created significant new business for Amec Foster Wheeler, with sales linked to this work now 10% of our overall E&I sales and growing fast. Many utilities are just beginning to address their requirements under the CCR Rule, so we are finding it to be our fastest-rising area of work. To meet this rapidly-rising demand, there is a special team within our Americas business unit that focuses on this area of work to address the needs of our clients and potential clients with respect to the CCR Rule.

EBJ: Besides the new CCR rule, what other new or projected regulatory drivers will drive your business?

Massey: In addition to the new CCR Rule, anticipated regulations for managing emerging contaminants are driving companies to seek our assistance in determining their potential liabilities in this area. Therefore, we see ourselves being much more active in this area going forward.

EBJ: How much new business do you foresee capturing from EPA's proposed Clean Power Plan regulations?

Massey: Like many others who work in the environmental field, I have closely followed the developments with respect to the Paris climate change agreement and EPA's proposed Clean Power Plan regulations. Although it is difficult to determine at this time how much new business Amec Foster Wheeler will derive as a result of this significant international treaty and poten-

tial new domestic regulations, it is clear that they will be quite impactful on new work for utilities.

Within Amec Foster Wheeler, the Clean Energy Market, rather than the Environment & Infrastructure Market, is where most of our climate change-related work is housed. E&I participates in this work, but does not lead it. Within our E&I business, we provide a broad range of environmental and infrastructure services to the utility industry, but most of this work would not be categorized as driven by climate change regulations or international agreements. Most of the Clean Energy Market's climate change-related work is focused on helping clients develop renewable energy projects, particularly solar and wind projects. It is difficult at this time to predict the impact of the EPA's Clean Power Plan regulations, if finalized and upheld in the courts, on this area of business.

EBJ: What is the approximate breakdown of Amec Foster Wheeler's C&E work driven by regulatory drivers vs. economic drivers vs. financial drivers?

Massey: That's not a breakdown we can estimate because we don't look at our business in this way at Amec Foster Wheeler. Our business is more market-focused, rather than focused on particular demand drivers. What I can say is that our work for particular customers is very often determined by all three types of drivers.

EBJ: What were some of the highlights for the environmental practice over the past year (significant new contracts, major projects, acquisitions, etc.)

Massey: I am very proud of the work we have done overall, but in particular, I would point out the rapid growth in our Government Services sector, as well as with our coal ash disposal (CCR) work. I have already touched on both of these areas of growth in detail, so I won't repeat all of that here.

In terms of specific project accomplishments, we scored a major win in Canada with the Port Granby low-level radioactive waste cleanup project. We continue to service several large programs in different sectors across the US, Canada, and Europe delivering consistently high quality

projects on budget and schedule. We hear from our customers that we are somewhat unique in our abilities to deliver that consistency. All of our staff is proud of our long-term programs.

EBJ: How did the company weather the “Great Recession”?

Massey: The E&I market has seen little overall impact from the “Great Recession”, which is due in large part to our flexible business model, track record of adaptability and innovation and lean and efficient cost base.

When we see a slowdown in one market, we quickly move our focus to other more promising markets. So, for example, as we have seen a 30% sales decline in our E&I oil & gas order stream due to the downturn in that industry over the past year, we have been able to offset that decline with a 30% increase in sales from our government sector.

We have been able to achieve this significant “weathering of the storm” by being extremely nimble in moving our people in response to fast-moving market forces. This has allowed us to balance our staffing levels as we moved people from one sector to another as opportunities have evolved. P&L is run from a geographic perspective rather than from a market perspective, which has enabled the rapid and efficient reallocation of our resources in response to changing demand. We also have achieved this positive result through very consistent and focused leadership, resulting in very little turnover in our executive staff ranks.

EBJ: In general, what is Amec Foster Wheeler’s strategy for growth in its environmental C&E work over the next two to three years (or longer, if you plan out that far)? Is acquisition a part of that strategy, and if so, what goals would acquisitions be designed to achieve (new geographies, new capabilities, new clients or client sectors, etc.)?

Massey: Our diversified business is not immune to the ongoing tough market conditions. We are managing the business on the assumption of an extended period of weakness in the oil & gas market, at least through the end of 2016. Currently, our primary focus is on further integrat-

ing Amec Foster Wheeler and taking advantage of synergies across all markets. In particular, we will focus on high growth markets, such as our fast-growing Government Services sector, and a renewed focus on improving performance in low growth areas.

Further diversification of our markets, services, and geographic reach is a key component of our future growth strategy. With respect to markets, we are focused on all sectors, but more specifically, we will make increased investments in our Industrial/Pharma and Government Services sectors. With respect to our services, we will focus on responding to the needs of our customers and being nimble in that response.

Finally, with respect to our geographic reach, we will be focused on growth in the Middle East and Asia regions. We are constantly evaluating opportunities for growth through possible acquisitions.

EBJ: What future growth rates do you see/predict for the environmental C&E industry generally over the next few years?

Massey: I think the larger C&E firms will continue to grow on average 2.5% organically over the next few years. The 5% projection made at the last EFCG Conference was too high for this year. History tells us that we are as an industry too optimistic in our growth projections. I have noticed this over-optimism trend over the past 6-7 years.

EBJ: Who currently are your biggest competitors, and who do you see being the environmental C&E industry’s top 4-5 players five years from now?

Massey: The biggest competitors in our markets are currently: AECOM, Arcadis, CH2M, and TetraTech. In my opinion, these firms, plus Amec Foster Wheeler, ERM and Golder, will be the top seven players for at least the next 2-3 years.

EBJ: What are some of the challenges you are facing heading into 2016?

Massey: Economic, political and social factors will continue to create fluctuations in our markets. Additionally, consultants continue to confront significant pricing and scope pressure as companies reduce

capital expenditures and put more pressure on the supply chain. Some examples of pricing pressure are so extreme that they are causing an industry-wide review of our industry’s pricing models, which if implemented, might require much lower overhead pricing.

Another example of a pricing pressure is where clients are increasingly requesting that we assign less-experienced mid-level technical experts to a project, in order to reduce the costs to them. However, these same clients still demand high-quality work from the same less-experienced technical experts. This is a constant challenge that we face.

While the ability to work across multiple sectors provides some balance, a downturn in one sector can negatively impact others. The ongoing slowdown in natural resources and commodities prices will continue to be a challenge for our industry as these markets continue to reduce capital spending.

As markets slow, retention and recruitment also become a challenge. An aging work force is a challenge in terms of creating possible ceilings for our younger employees to move up the career ladder. Internally, our Academy supports employees on their career journey to improve transferrable market skills and knowledge. Our recently launched “early careers” site allows innovative thinkers, scientists and engineers looking for their next career step to engage with us globally.

EBJ: What kind of response are you getting to this new “early careers” website? What kinds of “innovative thinkers” are you seeking to attract – which skill sets?

Massey: Response to the website has been great! We have received over 100,000 more views since opening it in October, than we did for all of 2014 with the previous website. The “early careers” website provides detail on the areas of the business and types of work we do and how we do it, which in turn has created a high number of applications from a wide variety of candidates from all different backgrounds and areas of interest. We look for innovative thinkers from across the engineering, science, environment and business areas,

and have seen a rise in candidates who are looking to move forward in the industry with us.

EBJ: Are you finding that you face unique challenges in attracting talent from the Millennial generation? What have you seen to be their special requirements in seeking an employer?

Massey: Our challenges are not unique, but we find that millennials are looking for work where they can make a difference and be globally connected. An engineering consulting career often provides these opportunities. With diverse projects in 55 countries, personnel have opportunities to work on projects across the globe. Millennials seek employment where their skills are fully utilized. Having honest and open communication about the job role and next steps required to advance are keys to retaining millennial talent.

EBJ: We hear increasingly that clients—federal and private—are trying to transfer more risk to their environmental service providers. What's Amec Foster Wheeler's view on this topic? How is the company handling the apparent demand by clients to take on more risk?

Massey: We have found that some of our customers are doing this. Amec Foster Wheeler has a detailed process for reviewing contracts and identifying risks as we target possible projects. We have many long-term customer relationships that we try to maintain even in the face of increased risk. However, we have declined some PBR type projects because the risks were too high.

EBJ: In general, what trends do you see in the overall field of environmental protection looking out 10-20 years?

Massey: As a result of the Paris Agreement, we will see continued and renewed focus on climate change, water scarcity, sustainable infrastructure, protection of natural resources, and air emissions, to name a few areas of impact. Having been at the forefront of building knowledge and expertise in these areas, Amec Foster Wheeler is recognized as an industry leader and should see sustainable growth in our revenue stream as a result for years to come. ■

Environment Analyst Reports Global Environmental Consultancy Market Declined 4% in 2014

The value of the global environmental consultancy (EC) market was \$27.5 billion in 2014, down 4% from 2013, according to U.K. business intelligence provider **Environment Analyst**. The EC sector lagged global economic growth of 3.4% in 2014, mainly owing to the impact of the international mining sector downturn, the oil price collapse and continuing squeeze on national government spending in key markets. Growth in larger firms was worse said EA, as its Global 23 peer group of EC practices declined 6.2%. Specialist environmental/sustainability consultancies are coping far better than those operating as part of broader integrated and multi-service companies says EA, going against the trend for 'super-sized' companies. EBJ caught up with EA editor Liz Trew on details about EA's most recent report.

EBJ: We at EBI have estimated the global market for "environmental consulting & engineering" as somewhat larger than EA's environmental consultancy market. Presumably this is because we include engineering, design, planning & permitting, CM/PM for water and APC and the inclusion of environmental information services. Do you agree or how difficult is it to draw the lines on services?

Trew: Yes I agree. At EA we have always focused on advisory/consulting studies and services only, excluding the engineering, contracting and construction side — although we do include design, planning and permitting where the main element of the project is the environmental aspect. With environmental information, that would be included where there is an advisory aspect but we don't include off-the-shelf environmental software tools. Market definition in this field is a thorny issue because the environmental consulting component of a project may form only a smaller part of a larger integrated package and every firm has a different view of "EC". But we do make clear our definition of the market in all our questionnaires and reports and always attempt to compare like with like through a robust verification process.

EBJ: How do you think the market for EC is different in the UK versus the USA?

Trew: I think they are quite similar in terms of the level of maturity. But one important difference is that the government sector is much smaller as a proportion of the market in the UK (22% in 2014, although prior to budget cuts it was more like 35%) relative to the private/commercial sector. And our global analysis suggests that, at least in part due to its heavy reliance in federal contracts, the North American regional EC market is actually in decline while the UK is currently growing - by low single digits - primarily on the back of a strong infrastructure pipeline.

EBJ: How do you think the market for EC is different in the UK versus Europe?

Trew: The EC sector in Europe cannot be considered as a single market because there are huge differences in the level of development, maturity and activity country-to-country. The UK represents one of the most well developed markets for EC services in the region, and there are others that are at a similar level: such as The Netherlands, Belgium and Denmark. Italy is considered to be about five years or so behind these countries and is just starting to look at seriously exporting its environmental consulting expertise internationally. Other countries such as France, Germany and some of the Nordic nations such as Sweden have smaller EC sectors than might be expected given their size, but it's all about cultural business differences — e.g. academic institutions may be the normal route to getting specialist advice, corporate in-house teams may do it themselves, or the environmental bit of work is done via overarching project management firms rather than specialist practices. Then there's Eastern Europe and the accession states where British-based firms are noting some success in supporting them to develop an environmental policy framework and build in anti-pollution technology and other infrastructure to bring them up to EU standards.

COMPANY INDEX

AECOM	26	Infrastructure Corporation of America	29
Amec Foster Wheeler	11	Intertek	31
American Chemistry Council	21	KJWW Engineering	31
Apollo Global Management	26, 28, 31	Kleinfelder	10
Architectural Testing Inc.	31	Kresge	16
Ares Management	33	Levine Leichtman Capital Partners	33
Arup	14	Milone & MacBroom	10
Fay Spofford & Thorndike	29	Morgan Joseph TriArtisan	3, 26
Bain Capital	31	National Association of Counties	10
Brown Gibbons Lang & Company	3, 32	New Mountain Capital	33
C40	14	Northgate Environmental Management	20
CB&I Stone & Webster	26	Olympus Partners	26, 31
CH2M	26, 31	OMERS Private Equity	29
Charterhouse Capital	29	Ontario Muni Emp Retirement Sys	26
Charterhouse Capital Partners	26	Pritzker Group	32
Chicago Metro. Agency for Planning	13	Professional Services Industries	26, 31
Coastal Risk Consulting	12	Ramboll	30
Dodge Data & Analytics	22	Rockefeller	14
Energy Capital Partners	26	Rusk O'Brien Gido + Partners	31
EnergySolutions	26	Stanley Consultants	13
ENR	22	Stantec	29
ENTACT	32	Sustainable Remediation Forum	21
Environ	30	Tetra Tech	30
EBI Inc.	1	The Shaw Group	26
EFCG	4, 27	Trinity Consultants	33
Environment Analyst	38	TTG Engineers	31
ERM	26, 29	Urban Land Institute	16
Florence & Hutcheson	29	Urban Sustainability Directors Network	16
Florida International University.	14	U.S. Energy Information Admin	21
FMI	22	Valet Waste	33
Georgetown Climate Center.	12	Valhi	26
Green Ribbon Commission	15	Waste Control Specialists	26
Gryphon Investors	33	Westinghouse Electric Company	26
Harvest Partners	33	WS Atkins	26
HDR	29		

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