

PROPERTY VALUATION TECHNIQUES

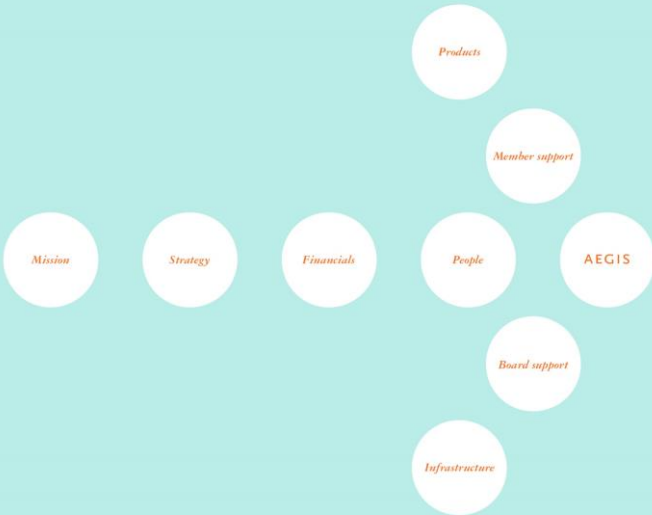
GARY LADMAN

Vice President – Underwriting, Property
AEGIS Insurance Services, Inc.

2016 PHC



2016 PHC



PROPERTY VALUATION TECHNIQUES *The Risk Manager's View*

ANDREW BAILLIE

Program Director, Global Insurance

AES Global Insurance Company

2016 PHC



PROPERTY VALUATION TECHNIQUES

The Risk Manager's View

- What was the need for an appraisal process for AES?
- The appraisal process
- Benefits derived by AES from completing and maintaining appraisals

2016 PHC



EVOLUTION



Harvard Review – 1997

“AES develops and operates electric power plants all over the world and by late 1996 has 20,000 employees. But the Corporation has no human resources staff at Corporate Headquarters or operating facilities. Moreover, the company has very little centralized staff at all, little or no strategic planning, no environmental department and almost no legal staff.”

2016 PHC



THE AES CORPORATION

Timeline of Development of Global Insurance Program and Captive



- AES is operating approximately 100 facilities in 22 countries
 - Captive is taking primary risk on these facilities with substantial reinsurance program supporting the captive. Insured values already \$35 billion
 - All policies came into the captive on an “as-is” transfer from prior arrangements
 - No consistent data on development of current PD or BI values in policies

2016 PHC



IMMEDIATE NEEDS IN VALUATION

- Understand basis of current values being declared
- Ensure consistency and adequacy of reported values
- Support equitable distribution of premiums and other policy conditions including % or \$ deductibles
- Defending reputation of AES, AES Global Insurance and all insurers and reinsurers involved in the program
- Step 1 – Initial tabletop comparisons suggested large variances of valuation adequacy which needed to be corrected
- Step 2 – Broker study (high level / limited scope) shows variances of -46% to +84% in outcomes comparing current values to replacement values across fleet

2016 PHC



PROPERTY VALUATION TECHNIQUES

The American Appraisal (AA) Journey

- AA appointed in 2006 with initial schedule of 2-3 years to visit all AES key locations in >20 countries
- Detailed reports to be provided for each location with plant and equipment specs to agreed level of detail
- Active comparisons for similar technology across AES fleet improved accuracy and defense of valuations
- Project grew as AES acquired and built more projects during initial phases



2016 PHC



PROPERTY VALUATION PROCESS

Post-Appraisal Outcomes

- Transparent and defensible property values across fleet allowing us to elect RCV or other methods of valuation as appropriate
- Allows more equitable sharing of costs of risk
- Useful for NAT CAT studies and modeling
- Hugely valuable for a number of asset divestments subsequently completed for appraised assets
- Values being updated for inflationary changes per country and also adjusted for asset retirements and new investments



2016 PHC



2016 PHC



PROPERTY VALUATION TECHNIQUES *The Valuation Perspective*

NIGEL P. WILSON, ASA, CEng.

Director, Insurance Services

Duff & Phelps

2016 PHC



PROPERTY VALUATION, WHY?

Questions that you need to ask yourself

- Are you confident that your statement of values accurately reports all of your insurable property?
- Have you kept pace with the change in assets within your facilities?
- Do you know where your properties' reported insurable values come from?
- How well was your statement of values received when last marketed? Did you receive push back from underwriters?



2016 PHC



BENEFITS OF AN INSURANCE APPRAISAL

- Determine the adequacy of insurance coverage
 - Complete property listing
 - Accuracy of values
 - No surprises at the time of loss
- Improved risk management
 - Consistent approach to quantification of risk
- Improved marketability to underwriters
- Optimizes CAT modeling performance
- Basis for equitable allocation of premiums
- Basis for preparation of a “proof-of-loss”
- Partnership – insured / insurer

2016 PHC



INITIAL DIAGNOSTIC REVIEW OF PROPERTY VALUES

What's the source of your current property listing and values?

- Appraisal
- Trended historical costs
- Standardized property values worksheets
- New construction costs
- Staff estimates
- Assistance from your broker / underwriter
- Don't know!

2016 PHC



INITIAL DIAGNOSTIC REVIEW OF PROPERTY VALUES

- Analyze property values by
 - Plant type
 - Coal, gas, hydro, waste / biomass, wind, nuclear, solar, etc.
 - Total kW generating capacity
 - Number of units
 - Active / inactive



2016 PHC



INITIAL DIAGNOSTIC REVIEW OF PROPERTY VALUES

Cost / MW Comparison

- Replacement costs should be similar, if not, why not?
 - Plant type
 - Number of units
 - Age
 - Modernization (new equipment?)
 - Pollution control equipment
 - Location
 - Urban, rural, remote, etc.

2016 PHC



INITIAL DIAGNOSTIC REVIEW OF PROPERTY VALUES

Construction Costs – Benchmarking Resources

- US Energy Information Administration (EIA)
 - Assumptions to the Annual Energy Outlook, Electricity Market Module, Table 8.2, Cost and performance characteristics of new central station electricity generating technologies
 - <http://www.eia.gov/forecasts/aeo/assumptions/pdf/electricity.pdf>

Table 8.2. Cost and performance characteristics of new central station electricity generating technologies

Technology	Online Year ^a	Size (MW)	Lead time (years)	Contingency Factors			Total Overnight Cost in 2015 ^{b,c} (\$/kW)	Variable O&M ^d (2015 \$/MWh)	Fixed O&M (2015 \$/kW/yr.)	Heatrate ^e In 2015 (Btu/kWh)	nth-of-a-kind Heatrate (Btu/kWh)
				Base Overnight Cost In 2015 (\$/kW)	Project Contingency Factor ^f	Technological Optimism Factor ^g					
Coal with 30% carbon sequestration (CCS)	2019	650	4	4,649	1.07	1.03	5,098	6.95	69.49	9,750	9,211
Conv Gas/Oil Comb Cycle	2018	702	3	911	1.05	1.00	956	3.42	10.76	6,600	6,350
Adv Gas/Oil Comb Cycle (CC)	2018	429	3	1,000	1.08	1.00	1,080	1.96	9.78	6,300	6,200
Adv CC with CCS	2018	340	3	1,898	1.08	1.04	2,132	6.97	32.69	7,525	7,493
Conv Comb Turbine ^h	2017	100	2	1,026	1.05	1.00	1,077	3.42	17.12	9,980	9,600
Adv Comb Turbine	2017	237	2	692	1.05	1.00	664	10.47	6.65	9,800	9,530
Fuel Cells	2018	10	3	6,217	1.05	1.10	7,181	44.21	0.00	9,500	6,960
Adv Nuclear	2022	2,234	6	5,288	1.10	1.05	6,108	2.25	98.11	10,449	10,449
Distributed Generation-Base	2018	2	3	1,448	1.05	1.00	1,520	7.98	17.94	9,004	8,900
Distributed Generation - Peak	2017	1	2	1,739	1.05	1.00	1,826	7.98	17.94	10,002	9,880
Biomass	2019	50	4	3,498	1.07	1.01	3,765	5.41	108.69	13,500	13,500

2016 PHC



INITIAL DIAGNOSTIC REVIEW OF PROPERTY VALUES

Construction Costs – Benchmarking Resources

- Gas Turbine World magazine
- Engineering firms
 - Black & Veatch
 - Sargent & Lundy
 - Bechtel
- Peer conversations

2016 PHC



COST TRENDS – USE & ABUSE

Construction Costs Trends – United States

- 1986-2003 (1% to 3% per year)
- Significant construction inflation in 2004 (10.5%)
- Slowing but not back to normal in 2005 and 2006 (5.5% to 8.0%)
- A definite slowing in 2007 (2.8% to 4.7%)
- Commodities cause increases in 2008 (6.7 to 7.2%)
- Prices fall back with economy in 2009 (-7.0 to -0.3%)
- Inflation stabilizes in 2010 (-1.4% to +4.9%)
- Continued stabilization in 2011 (2.5% to 4.5%) & 2012 (1.5% to 2.8%) and 2013 (2.2% to 3.7%)

2016 PHC



COST TRENDS – USE & ABUSE

Construction Costs Trends – United States

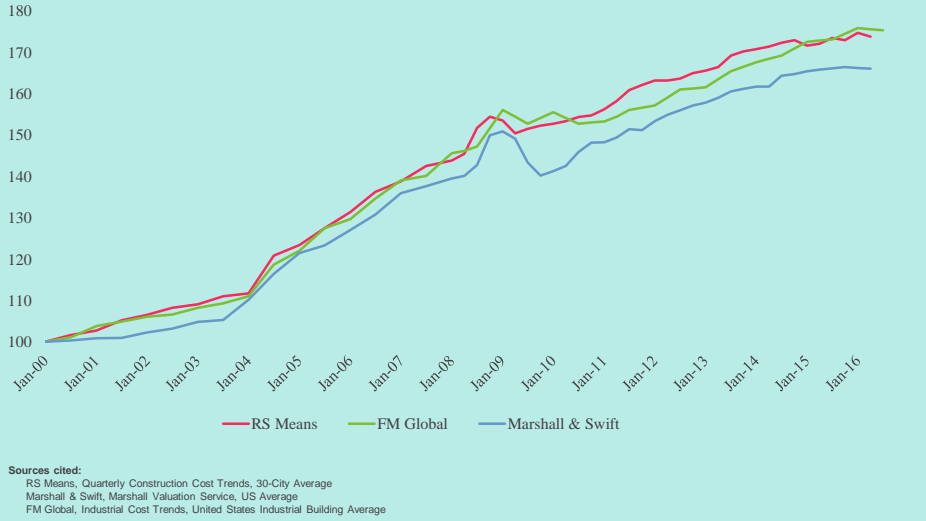
- Steady in 2014 (0.5% to 2.9%) and 2015 (0.5 to 1.9%)
- Most recent 12 months sees a decline in the rate of inflation
 - FM Global +1.3% (**July 2015 - July 2016**)
 - RS Means +1.0% (**April 2015 - April 2016**)
 - Marshall & Swift +0.1% average, range -0.2 to +0.7% (**April 2015 - April 2016**)
- 25% - 30% inflation in seven years

2016 PHC



COST TRENDS – USE & ABUSE

US Average Construction Cost Indices, January 2000 to July 2016

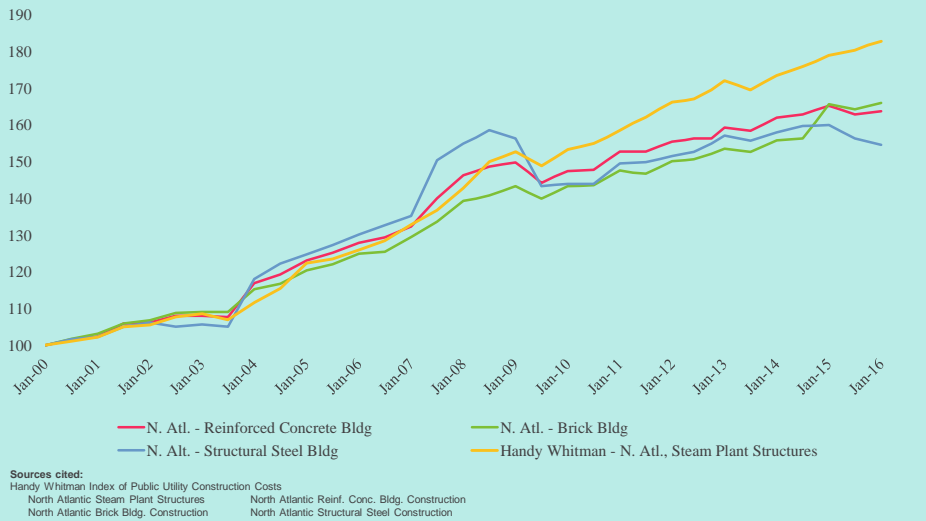


2016 PHC



COST TRENDS – USE & ABUSE

Handy Whitman Construction Cost Indices, January 2000 to January 2016

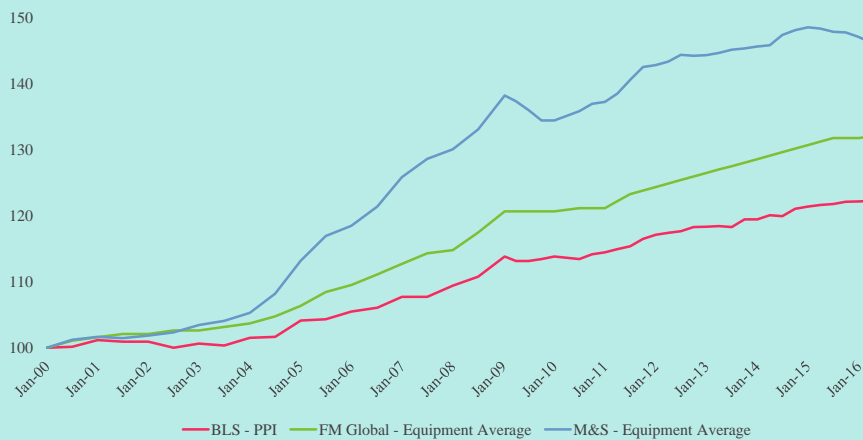


2016 PHC



COST TRENDS – USE & ABUSE

Average Equipment Cost Trends – United States, 2000 – July 2016



Sources cited:

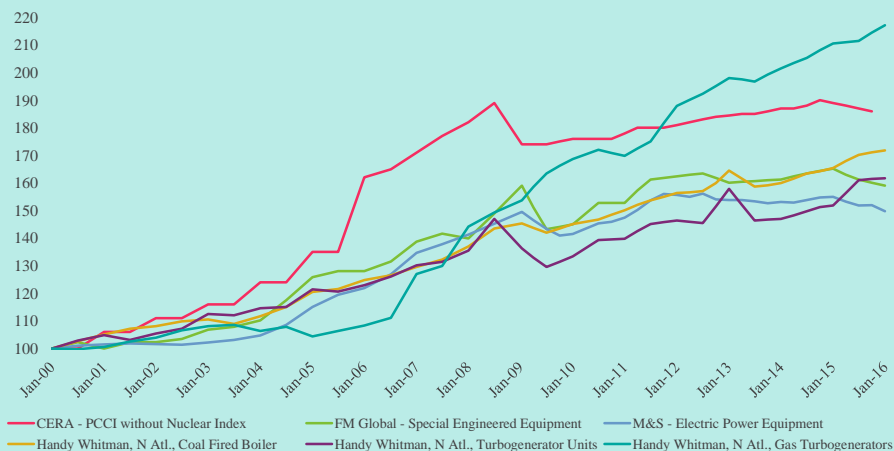
M&S: Marshall Valuation Service, Marshall & Swift Quarterly Cost Index, Industrial Equipment Average of All
 FM: FM Global, Industrial Cost Trends, Industrial Equipment Composite
 PPI: US Department of Labor, Bureau of Labor Statistics, Producer Price Index, Finished Goods Seasonally Adjusted, Table WPSSOP3200

2016 PHC



COST TRENDS – USE & ABUSE

Power Generation Equipment Cost Trends – United States, 2000 – January 2016



Sources cited:

M&S: Marshall Valuation Service - Marshall & Swift Quarterly Cost Index, Electric Power Equipment
 FM: FM Global - Industrial Cost Trends, Special Engineered Equipment
 Handy Whitman Index of Public Utility Construction Costs, N Atl, various equipment trends
 IHS / CERA - Power Capital Cost Index without Nuclear

2016 PHC



VALUATION SOLUTIONS FOR AES

Property Portfolio in 2006

- 76 facilities
- 22 countries
- 28,400 MW of generating capacity
- Appraisals to be conducted over two-year time frame
- 2006 pilot study
 - Three sites in Oman, Argentina and the United States
 - Reports reviews
 - Report format updates
 - Cover photos of plants
 - Report narrative updates
 - Executive summary including total capacity and \$/MW
 - Narrative site description
 - Photo exhibit

2016 PHC



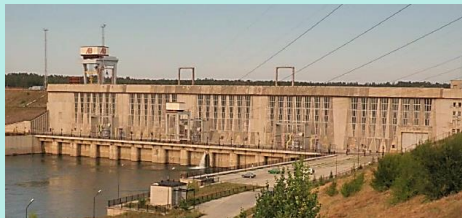
VALUATION SOLUTIONS FOR AES

Appraisals

- 2007 23 facilities
- 2008 39 facilities
- 2009 9 facilities
- 2010 17 facilities
- 2011 4 facilities
- 2012 3 facilities

Type of generating plants appraised

- 55 fossil fuel 26,141 MW
- 24 hydro 5,078 MW
- 11 wind 1,316 MW
- 3 solar 20 MW
- 3 biomass 49 MW
- 1 shipping terminal



2016 PHC



VALUATION SOLUTIONS FOR AES

Appraisals – Scope of Service

- Buildings – site inspection
 - Review of available as-built plans
 - Measuring of dimensions
 - Determination of primary construction components
 - Review of building services, interior and exterior finishes, etc.
 - Photographing of each building
 - Development of replacement cost using local construction cost resources
 - Reporting of values (and COPE data if required) by building
 - Evaluation of land improvements (if required) – parking lots, signage, outdoor lighting, etc.



2016 PHC



VALUATION SOLUTIONS FOR AES

Appraisals – Scope of Service

- Machinery & equipment / personal property
 - Detailed asset listing by comprehensive site inspection
 - Inspected and inventoried
 - Asset number, description, model number, serial number and manufacturer
 - Predetermined equipment listing cut-off of \$1,000,000
 - Asset below this cost grouped with like kind assets
 - Assets repriced using a variety of sources
 - Values reported by floor by building



2016 PHC



VALUATION SOLUTIONS FOR AES

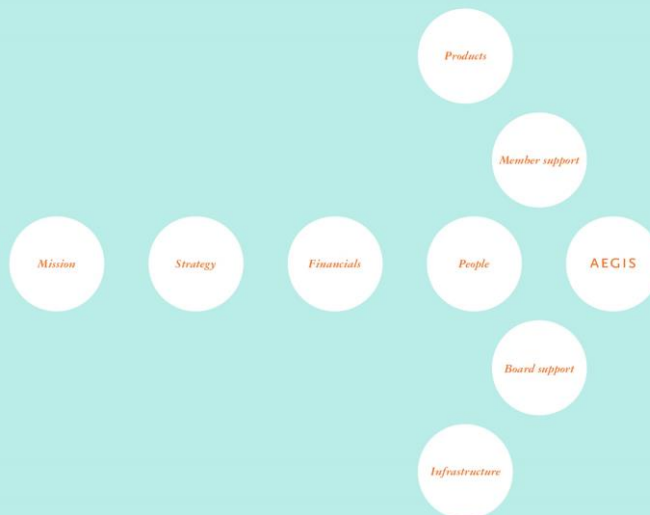
Ongoing Appraisal Service

- Initial hard copy / PDF report format changed to web-based report delivery
 - Stores original PDF reports
 - Select and view individual buildings and associated contents
 - Sort on five different levels using 16 key data elements
 - Download sorts to Excel and PDF
 - Allow restricted access to employees / brokers / underwriters
- Annual updating of appraisal reports
 - Trending using Handy Whitman, CERA PCCI, FM Global and local inflationary indicators
- Annual custodial meetings with AES and Duff & Phelps team

2016 PHC



2016 PHC



PROPERTY VALUATION TECHNIQUES *Underwriting Perspective*

JUSTEN BYRNE

Vice President – Underwriting, Property
AEGIS Insurance Services, Inc.

2016 PHC



IT IS
WISER
TO FIND
OUT THAN
TO SUPPOSE.

MARK TWAIN

2016 PHC



PROPERTY VALUATION TECHNIQUES

Underwriting Perspective

- The basic goal behind buying insurance is to make you financially whole following a loss. You agree to pay a fee for insurance today, causing a certain cost to you now, in exchange for a guarantee from the insurance company that it will bear the burden of a large but **uncertain** loss in the future.
- Property valuation is important because it determines the dollar amount that will be paid in the event of a loss. Because different types of valuation can be used, UWs and policyholders must have the same understanding of the policy details to clearly know what coverage is in place for premium rating and indemnification of loss.

2016 PHC



PROPERTY VALUATION TECHNIQUES

Underwriting Perspective

- Basic valuation definition / clause
 - A provision in a property policy that specifies the basis of indemnification when property is damaged or destroyed
 - Actual cash value (ACV) valuation clause stipulates that the insurer will **deduct** depreciation from the cost to replace the property
 - Replacement cost (RC) valuation clause stipulates that there will be no deduction for depreciation
- Property definition
 - Anything that has value and includes
 - Real property – i.e. buildings and permanent machinery & equipment
 - Business personal property – all ‘other’ property and can be easily moved

2016 PHC



PROPERTY VALUATION TECHNIQUES

Underwriting Perspective

- Mergers / acquisitions / divestitures
 - These occurrences are significant events that have meaningful impact on values
 - Knowing each entity's philosophy on valuation of the assets merged, acquired, or divested is critical to establishment of proper valuation going forward
- New construction / additions
 - Full contract value costs are a 'marker' that can be used for final valuation for operational coverage upon completion
 - The RCV or ACV of a project should be adjusted to accurately reflect the final valuation at operational phase, and maybe higher or lower than full contract value

2016 PHC



PROPERTY VALUATION TECHNIQUES

Underwriting Perspective

- Schedule of values (SOV)
 - UWs use the SOV to evaluate valuation based on overall experience and many of the indices presented today
 - Knowing the valuation techniques employed is reviewed at each submission, i.e. are the values trended and by what index, last full or partial appraisal of key assets, are values 'flat' year-over-year, etc.
 - As a guideline; appraisals for AEGIS-specific accounts should be completed every 3-5 years, with a top end of no more than 7 years if trending methodology is acceptable
- Engineering loss control surveys / inspections
 - The AEGIS LC engineering team of management, account and field engineers all are highly experienced and provide direct input to UWs
 - Notice from our engineers upon their review that the values provided may not align with industry / account specific experience will initiate a conversation to fully understand and engage with our brokers & members

2016 PHC



