Power Generation

The Insurer's View: How can the Insurance Market respond to the Opportunities and Challenges?

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Liberty Specialty Markets

Power Generation – Opportunities and Challenges

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Presentation Overview

- Introduction to the Liberty Mutual Group
- Security and Balance of Electricity Supply - Critical Considerations
- Existing Portfolio Management Techniques
- Evolving Risk Assessment and Pricing Methodology
- Practical Conclusions

Liberty Mutual Group – Introduction

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Liberty Mutual Insurance Group

- Founded in 1912
- Headquartered in Boston Massachusetts
- $37.6 billion 2015 annual revenue
- Standard & Poor's Rating "A" (Strong)
- 73rd on US Fortune 100 list
- 5th largest property & casualty insurer in US
- More than 50,000 employees
- Over 800 offices worldwide

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- Over 50 specialty and commercial insurance & reinsurance products
- GWP $3,397 million
- 900 employees
- 26 offices across key UK, European, Middle East, US and other international locations

Liberty Specialty Markets Underwriting Principals

- Understanding of Power Industry changing dynamics

- New plants – potential teething problems
- Ageing plants versus maintenance
- Technology developments

- Thorough understanding of Client Account Profile
- Risk selection paramount
- High ratio of Engineers to Underwriters
- Focused on key industry risk elements of electrical/mechanical breakdown

Insurance Buyer/OEM/Broker/Insurer partnership considered essential

Industry Factors
Security of Supply – Critical Considerations

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- Fluctuation in material repair/replacement costs can threaten the integrity of declared insured values
- Emerging markets influencing supply of new technologies
- Replacement of ageing and inefficient infrastructure
- 70% of global steam cycle operations are in excess of 35 years old
- More widespread use of advanced materials e.g. ultra-super critical
- Competition between the leading OEM's to continue

Industry Factors
Security of Supply - Critical Considerations

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- Increased levels of operating flexibility required
- Desire to meet strict regional environmental regulation e.g. fuel mix
- Market deregulation - increase investment but reduce cost to the consumer
- Regional weather patterns have impact on sustainability of electricity supply
- More complex regional grid interconnections to regulate fluctuations in peak demand
- Shift in generation to IPP's is depleting experienced staff in existing generators

Industry Factors
Security of Supply - Critical Considerations

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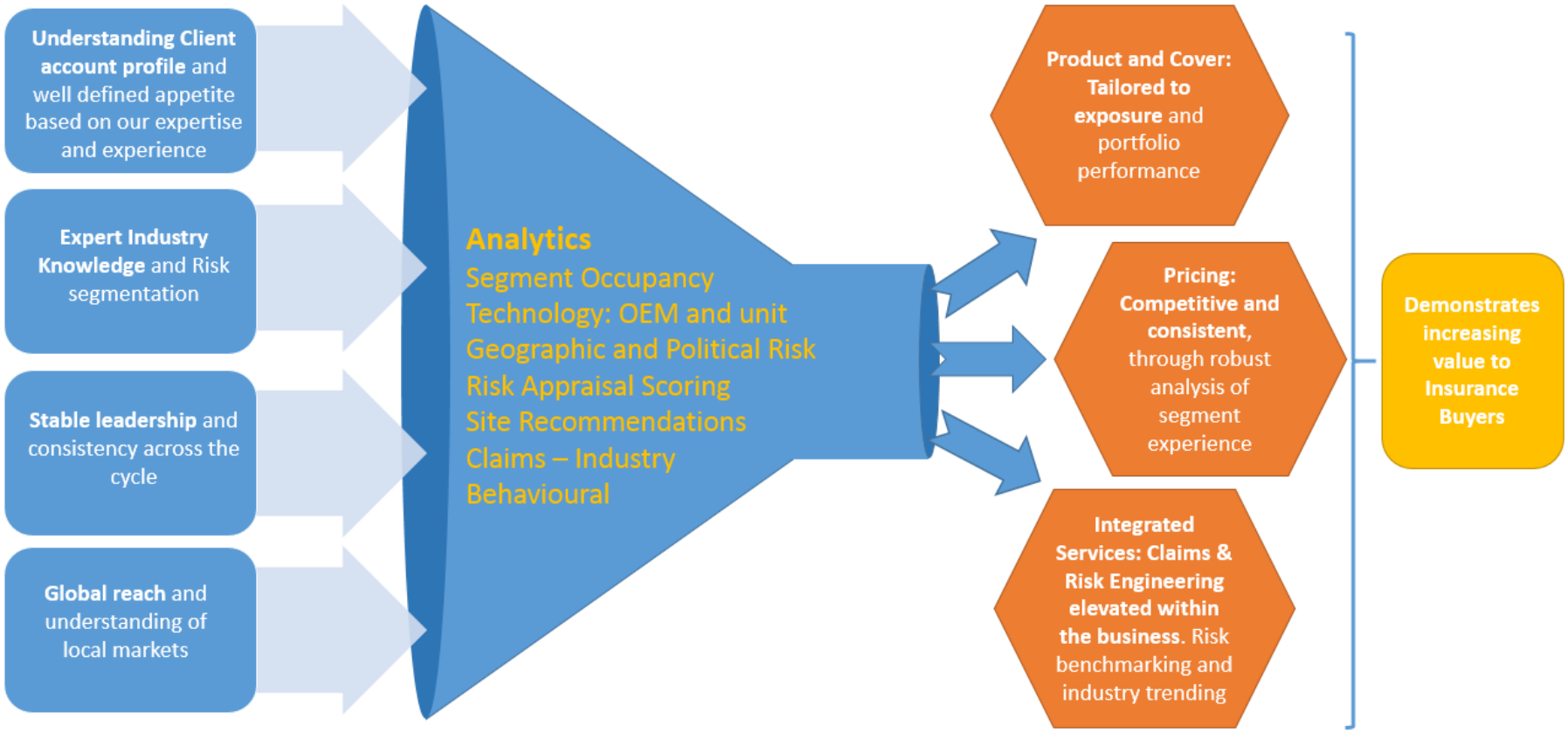
In a flyer for its conference ***"Skills shortages – who will keep the lights on?"*** the UK Institution of Engineering and Technology states:

"The Energy Sector faces major challenges over the coming decades. Huge investments in new generation and network replacement are required just at a time when approximately 40% of the people with the necessary skills approach retirement".

Risk Assessment Methodology
Value Proposition – the drive for differentiation



Risk Assessment Methodology
Insurance Buyer Assessment

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Insurance Buyer ‘behaviour’ can significantly influence insurance pricing approach through:

- Financial Status and Integrity
- Positive information sharing at a technical and commercial level
- Account quality and receptiveness to risk engineering approach
- Confidence to self retain risk e.g. ‘captive’ retention
- Historically profitable
- Business Continuity Planning e.g. business interruption
- Insurance buying characteristics consistent across the insurance cycle

Risk Assessment Methodology
Natural Perils

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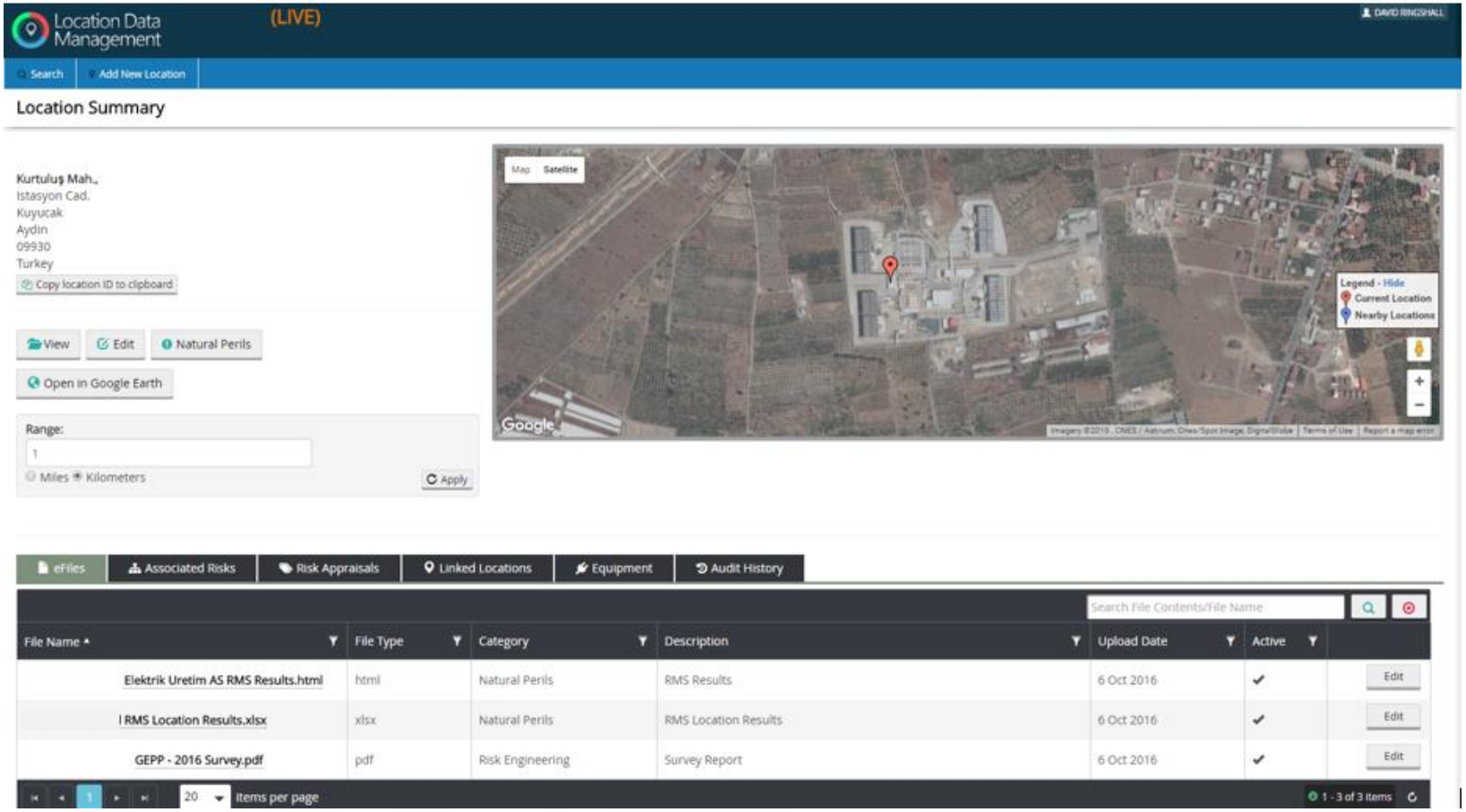
Location Data Management



Risk Assessment Methodology
Risk Appraisal – Location Based

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Property Damage (6 main categories, 32 sub-categories)

- Design and Construction
- Operations
- Maintenance and Inspection
- Safety
- Performance Measurement
- Loss Control and Mitigation

Time Element

- Business Interruption

Risk Assessment Methodology
Risk Appraisal – Ageing Plant and Equipment

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Maintenance and Inspection	Performance Measurement
• Operational maintenance and inspection history • Control of contractors • Testing of safety devices • Experience and qualifications – operative training	• Physical condition • Planned maintenance/inspection frequency • Reliability/Availability • Life time monitoring

Ensure that scope of maintenance and inspection activity and expenditure is commensurate with age/operating regime

Risk Assessment Methodology
Risk Appraisal – Emerging Market Manufacturers

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- Independent Owner's engineer embedded in design group
- Deployment of independent 'quality' assessment inspection company
- Authority to drive/influence established design approach and practice
- Assessment of OEM's capabilities and workshops
- Design reviews and factory inspection tests on critical items
- Inspection programme supported by regular progress reports

Risk Assessment Methodology
Risk Appraisal – Technological Advancement

- Design change - output, reliability, efficiency, fuel variation
- Does the modification include changes of material/design
- Works testing undertaken and comparison with intended operational performance
- Details of specialist monitoring anticipated by OEM
- Provision of spares for new technology and delivery times
- Estimate of damage potential given the degree of alteration
- Evaluation of differences in Construction v Operational inherent hazard

Risk Assessment Methodology
Risk Appraisal – Location Based

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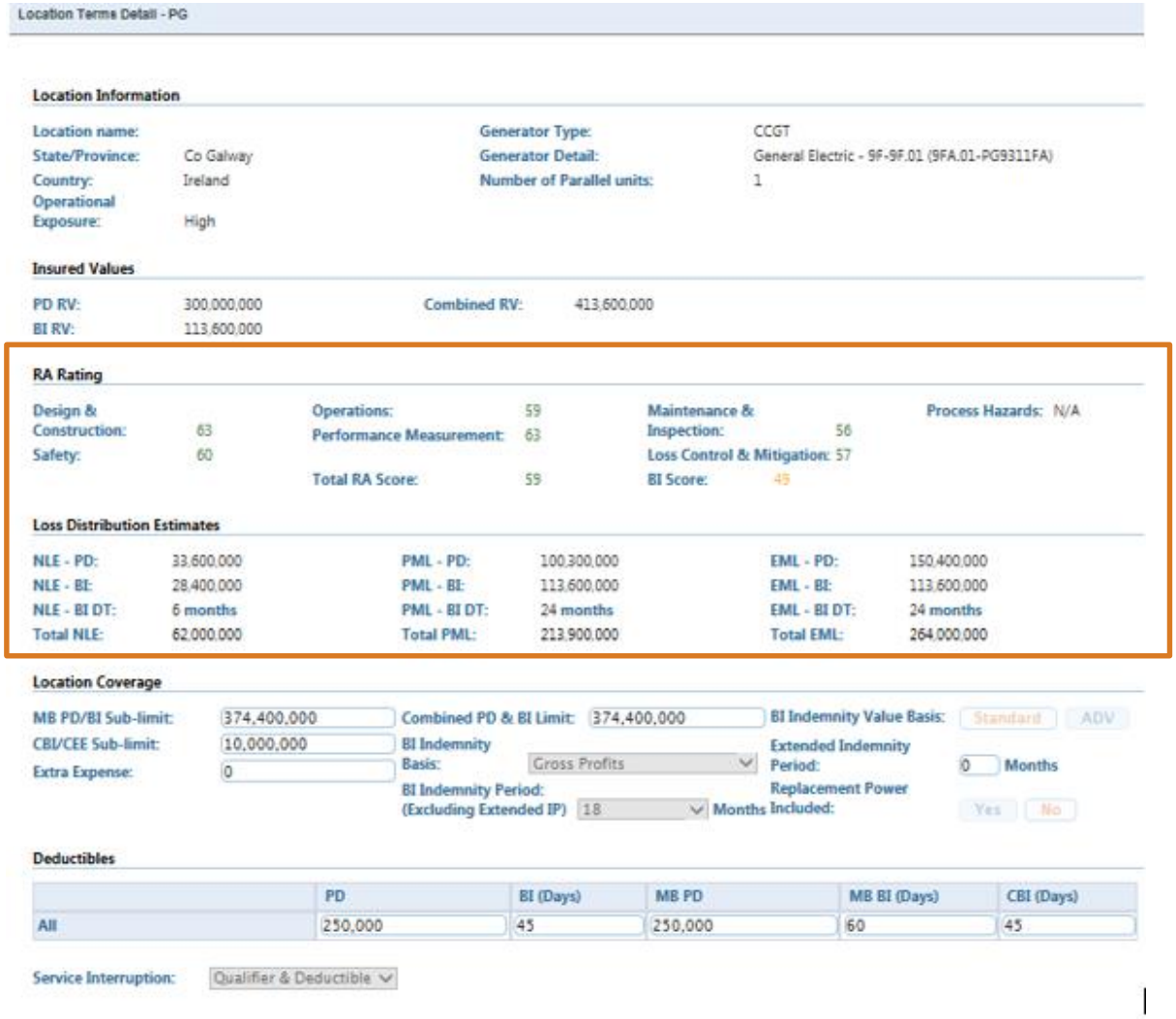

Location Terms Detail - PG

Location Information

Location name:		Generator Type:	CCGT
State/Province:	Co Galway	Generator Detail:	General Electric - 9F-9F.01 (9FA.01-PG9311FA)
Country:	Ireland	Number of Parallel units:	1
Operational Exposure:	High		

Insured Values

PD RV:	300,000,000	Combined RV:	413,600,000
BI RV:	113,600,000		

RA Rating

Design & Construction:	63	Operations:	59	Maintenance & Inspection:	56
Safety:	60	Performance Measurement:	63	Loss Control & Mitigation:	57
		Total RA Score:	59	BI Score:	48

Process Hazards: N/A

Loss Distribution Estimates

NLE - PD:	33,600,000	PML - PD:	100,300,000	EML - PD:	150,400,000
NLE - BI:	28,400,000	PML - BI:	113,600,000	EML - BI:	113,600,000
NLE - BI DT:	6 months	PML - BI DT:	24 months	EML - BI DT:	24 months
Total NLE:	62,000,000	Total PML:	213,900,000	Total EML:	264,000,000

Location Coverage

MB PD/BI Sub-limit:	374,400,000	Combined PD & BI Limit:	374,400,000	BI Indemnity Value Basis:	Standard / ADV
CBI/CEE Sub-limit:	10,000,000	BI Indemnity Basis:	Gross Profits	Extended Indemnity Period:	0 Months
Extra Expense:	0	BI Indemnity Period: (Excluding Extended IP)	18 Months	Replacement Power Included:	Yes / No

Deductibles

	PD	BI (Days)	MB PD	MB BI (Days)	CBI (Days)
All	250,000	45	250,000	60	45

Service Interruption: Qualifier & Deductible

- Technology inherent hazard
- Insured Values
- Loss Estimates
- Technical Risk Benchmarking
- Influences Pricing Approach

Risk Assessment Methodology
Pricing Approach

Factor	PD	BI	Total
Rateable Value	300,000,000	113,600,000	413,600,000
EML	150,400,000	113,600,000	264,000,000
PML	100,300,000	113,600,000	213,900,000
Curve	H		

	PD	BI	CBI
Base Rates			
Ground Up	0.2603%	0.7301%	0.0906%
Model Modifiers			
Each & Every Deductible	-11.3%	-13.7%	-9.9%
Indemnity Period	0.0%	-25.2%	-24.2%
Sub-Limit	0.0%	0.0%	-83.6%
RA	-4.4%	1.0%	0.0%
Power EE/RP	0.0%	0.0%	0.0%
Discretionary Modifier %			
Location Specific	0.0%	0.0%	0.0%
Policy Level	0.0%	0.0%	0.0%
Discretionary Modifiers $			
Location Specific	0	0	0
Policy Level	0	0	0
Total	0	0	0
Rate on Exposure exc. Loss Experience Modifier			
Rate on Exposure	0.2207%	0.4759%	0.0102%
Loss Experience			
Modifier	-20.0%	-20.0%	-20.0%
Ground Up Final			
Rate on Exposure	0.1765%	0.3807%	0.0081%
Premium	529,570	432,497	9,244

Total Premium

TOTAL Premium (PD+BI+CBI)	971,311
TOTAL Rate	0.2348%

Technical Rates adjusted for:

- Client Behaviour
- Risk Quality
- Self–retention levels
- Historical Performance

Risk Assessment Methodology
Pricing Approach

					100%		For Participation	
Technical Premium Summary								
Operational			1,258,172		1,258,172		42,778	
Capacity Charge			96,668		96,668		3,287	
Natural Perils			77,792		77,792		2,645	
Total Technical Premium	2,127,926,677	0.0673%	1,432,632	0.0673%	1,432,632		48,709	
Net Market Premium								
Operational					1,354,840		46,065	
					1,354,840	(Gross)	46,065	(Gross)
Natural Perils					77,792		2,645	
					77,792	(Gross)	2,645	(Gross)
Total Net Market Premium	2,127,926,677			0.0343%	1,432,632		48,709	
					1,432,632	(Gross)	48,709	(Gross)
					☐ Override			
Rate Benchmark (Net)								
Operational	100 %							
Natural Perils	100 %							
Total	100 %							

Establishes the foundation for portfolio analysis of:

- Price Movement
- Price Adequacy

Current Insurance Industry Focus

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- Financial integrity of Insurance Buyers
- Basis of valuation – encourages consistent approach & fairness to all Insurance Buyers
- Natural perils - enhanced risk assessment and line structure control
- Combustion Turbine - review segmentation and pricing continues to evolve
- Under-performing sectors are under review e.g. Waste to Energy
- Hydro-Electric - emphasis on integrity of Civil and Infrastructure Works
- Business Interruption – balance actual operational loss scenarios with intended basis of loss settlement

Conclusions

- Global investment planned to reach US $450bn within the Power Generation sector over next decade
- Application (segment) and technology challenges will continue unabated
- Framework to promote security of supply with investment in facilities/people
- Insurers becoming more creative in risk assessment processes
- Current Insurance Buyer benchmarking and risk information is considered essential to underpin this process
- Encourages accuracy, transparency and fairness in pricing approaches