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# Performance of Generating Plant: Managing the Changes

World Energy Council 2008

Promoting the sustainable supply and use  
of energy for the greatest benefit of all



# Performance of Generating Plant

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## Performance of Generating Plant

World Energy Council 2008

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# Markets and Risk Management Strategy

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# Work Group 4

## Markets & Risk Management Strategy

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**Prepared in Cooperation and  
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- ▶ Eskom Financial and Business Planning  
Process Coordinators
- ▶ Portfolio Representatives

# 1. Work Group Objectives and Mandate

The terms of reference of this Workgroup can be directly related back to the Terms of Reference related to the Performance of Generating Plant as captured in the 2005 – 2007 WEC Terms of Reference, i.e.:

Promote the international exchange of data and information on generating plant performance to facilitate the most effective use of generation assets and energy resources worldwide.

Building on the findings of Committee's extensive research and analysis of the factors determining the performance of generating plant, particular emphasis will be placed on communications and a wider deployment of the recommendations and methodologies for improvement of power plant availability developed or identified by the Committee.

The second phase in the development of WEC's generating plant performance indicators database will be completed. Annual power plant availability statistics collection and direct entry of data into the WEC database by participating companies and organisations will be encouraged.

This led to the creation of 4 Working Groups, with WG4 mandated to look into Markets and Risk Management, with the objective of monitoring the development of power markets, in particular from the market risk management point of view, including operational risks. It will assess various risk management strategies used by market players around the world and develop recommendations for a wider deployment of successful strategies.

WG4 therefore formulated its Terms of Reference, which was adopted by the WEC PGP Committee in 2005 at Amman, as follows:

- ▶ To establish means to determine the risks in power markets and the methods implemented to manage such risks. Cognisance is to be taken of the continuing changing market environment while maintaining confidentiality of the project participants.

## Objectives:

- Establish world wide participation reflected by the Work Group Members and identify those risks, uncertain future events, and the relevant markets that could influence the achievement of the power plants objectives.
- Establish a categorisation standard for these risks indicating opportunities for benefit or threats to success
- Establishment of best practices for Risk Management with regard to termination, tolerance or mitigation of each risk and the use of flexibility, forward planning etc
- Establish a glossary of market developments that have created changes in risk to power plants.
- Establish methods for reviewing and reporting on risk tolerance and risk management processes

## 2. Approach and Project Plan Outline

With WG4 being a new working group, it intends to look at the issues which for many WEC members and supporting organisations may represent totally new concepts. In recognition of the need to develop a common understanding of concepts and methodologies, the 2006 WEC PGP Committee meeting agreed to follow the below approach:

- Initial discussion at the PGP meeting in Amman to finalise the concept.
- Contact WEC and PGP members and determine the most likely contributors.
- Determine where they are regarding markets & operational risk.
- Establish any commonalities, areas of mutual interest/concern.
- Define what to measure & how.
- Get buy in and support from WEC/PGP/WG members, either at meetings or by mail (corresponding contributors)
- Report back at PGP meetings and present findings to the 2007 Congress in Rome, Italy

In order to clarify the detailed approach to be adopted by the WG, an initial survey was undertaken to gauge the degree of risk management within the industry and to give some insight to the work group as to the strategies and methods used to manage risk. Initial responses were limited to only 4 members, although others did undertake to cooperate further on this initiative.

It appeared that the main reasons for the limited response could be due to:

- Increase competitiveness of markets making utilities hesitant to share perceived confidential information and / or,
- Utilities not willing to risk being shown to be lacking in risk management?

Based on the level of response and in recognition of the need for commercial sensitivity, especially related to risk management strategies, the WG agreed to adopt a 'non threatening' approach and to focus on developing best practice guidelines, supplemented with real world experience without impacting / disclosing the competitive strategies of members and participants.

WG4 therefore at its meeting in September 2006 adopted the following project framework for the structuring of the work of the team and its final report:

- Enterprise Risk Management Practice
- Best Practice Theory
- Member utility experience / application
- The Electricity Value chain
- 'hot spots' in the value chain
- Member utility experience / application / solutions
- Best Practice lessons

- Performance and Risk Management
- Striking the triple bottom line balance: Aligning economic, stakeholder & environmental performance
- Sort term profitability vs. Sustainability
- Member utility experience / application / solutions
- Best Practice lessons
- The 'capacity crunch'
- Opportunity for investors and suppliers
- Contrasting vs. complimentary risk management solutions
- Creating win-win supplier-investor relationships

Key milestone dates were determined as follows:

- First draft recommendations to be developed and presented to the WG by end January 2007.
- The Work Group review and contributions by end of March 2007
- Final inputs and editing of the WG report to be completed by end May 2007.

Feedback will be given to the WEC PGP Committee that meets in Brazil in the first week of April 2007.

# 3. Project Outcomes

## 3.1 Enterprise Risk Management Best Practice

### 3.1.1 Why do Enterprise Risk Management?

Enterprise Risk Management is an integral part of Good Corporate Governance. Financial reporting irregularities led to the establishment of the 'Financial Aspects of Corporate Governance Committee' led by Sir Adrian Cadbury. The resulting Cadbury Report published in 1992 outlined a number of recommendations around the separation of the role of the chief executive and chairman, balanced composition of the board, selection processes for non-executive directors, transparency of financial reporting and the need for good internal controls. The Cadbury Report included a Code of Best Practice. Following on further corporate failures, Dr. Shann Turnbull's Committee in September 1999 produced the first comprehensive guideline with respect to improvement in Corporate Governance. His work remained the international benchmark in South Africa until 2002 when the South African King Commission published its report on Corporate Governance which built on the fundamentals established through the above mentioned work. The report is generally referred to as the King 2 Report.

King 2 is very clear in its description of the accountabilities of directors specifically, and company management in general, stating that Corporate Governance is essentially about:

- Promoting best business practice
- Enhancing organisational performance and wellbeing
- Adding shareowner and stakeholder value

It goes beyond pure structure to encompass all business processes. It is therefore important to note that corporate governance is not about indicating compliance to appropriate 'rules', but rather towards demonstrating that fundamental good business practice is alive and well in everything the organization undertakes. The thrust is therefore towards a pro-active approach to sustaining and enhancing business performance, rather than fire-fighting and defense in preventing corporate failures. This approach therefore focuses on a positive contribution. Therefore, corporate governance, and as such also enterprise or integrated risk management, includes opportunity management.

The importance of the role of directors is reflected in the following duties bestowed upon company directors, as per King 2:

- Act as an agent of the company (therefore, a 'member' of the company)
- Ensure that the organisation trades towards its objectives (represent shareholder interests)
- Duty of good faith / loyalty (ethical behaviour and no conflict of interest!)
- Duty of applying care and skill in the exercise of accountabilities
- Duty of attention with respect to the operations and performance of the business
- Compliance to statutory obligations

As such, the board through its individual directors, has to ensure at least the following:

- That appropriate and effective strategic planning process are in place
- Has to identification and monitor strategic risks
- Has to review and monitor corporate performance
- Assesses the performance if senior management
- Ensures an effective communication policy

- Monitors the performance of risk management, internal controls and Management Information Systems to support business performance and sustainability.

The practice of Enterprise Risk Management is therefore of utmost importance as a tool to assist the board in expediting its duties.

Risk management is therefore not an 'add on' activity, but very much an integral part of business management with the ultimate objective of minimizing the variability and unpredictability of expected performance outcomes.

### 3.1.2 Elements of Enterprise Risk Management (ERM):

With ERM being strongly related to Corporate Governance, it is inevitable that a crucial component will be based on 'structure', while methodology and execution will be managed through some form of 'process'. Ultimately, a combination of structure to ensure governance accountability and responsibility together with sound business process application will provide for successful ERM execution. Thus, it is not only a case of 'having it' (structure), but also 'doing it' (process). While these two elements are formally recognised in King 2, experience has shown that 'commitment' is an equally important third element for success; if not, progress and execution is dependant on the success of a 'driver' to steer and manage ERM across the organisation. These key elements are dealt with in further detail below.

Table 1

Functional Area	Context	Accountability
Technical Performance	Availability, Reliability, Efficiency	Vice President - Technology
Financial Performance	Profitability, Sustainability, SHV	Vice President - Finance
Human Performance	Performance, Retention, Reward	Vice President – Human Resources
Policy & Regulation	Compliance, Exposure	Company Secretary

### 3.1.2.1 Structure

Structure refers to the formalised governance processes established in the organisation to ensure that sufficient guidance is provided with respect to the risk appetite and tolerance of the organisation, as well as the formalised processes for review of compliance to the provided positions with respect to risk exposure and accountability.

Based upon generic business structure, it is therefore important that risk be reviewed for its impact on business performance and sustainability at Board level. This is usually done through a dedicated Risk Committee.

At executive level, risk management is more often than not directly related to line or functional accountability and as such requires clear assignment of accountability, if not self evident from the structure of the organisation. It is suggested that such responsibility is captured in a Risk Accountability Matrix that clearly defines the scope of accountability as well as the responsible individual or position in the organisation.

An example is illustrated above. The above example can be further developed to an appropriate level of categorisation and depth, depending on the size and complexity of the organisation.

### 3.1.2.2 Process

Process refers to the formalised business processes and methodology established in the organisation to ensure that risk is identified, assessed, managed and reported in such a way that the possible impact on the achievement of goals can be highlighted and management actions to ensure achievement of goals in a sustainable way be monitored. Generally, risk should be identified and managed as close as possible to the point of origin as this is where the greatest knowledge base with respect to the risk and the greatest opportunity to manage its impact and likelihood are likely to reside.

Depending on the type of organisation, risk processes can be either led by staff or line functions. A combination of both usually renders best results. In a typical power generating company, risk at power station level is likely to originate from various disciplines like human resources (strikes), finance (forex) or technical (unavailability). From a Corporate perspective though, it will be very useful to have a good understanding off all technical or Human Resources risks across the various sites so that common trends can be identified and an integrated risk management strategy be developed to deal with common problems, e.g. labour unrest, ageing of control systems. It is therefore recommended that the risk reporting process allows for the accumulation of risks across various disciplines at site level, then being integrated per functional discipline to assist in developing best company wide solutions or guidelines for the management of such risks.

### 3.1.2.3 Risk Management Methodology

Many different processes are used by individual organisations. Ultimately though, in the final resolve, the objective is to define exposure (also called impact or severity) as well as the likelihood of the event occurring (this can also be split into probability and frequency). Once again, depending on the environment, highly complex probabilistic analysis can be used, versus knowledge or 'gut feel' based assessment.

Ultimately though, irrespective of whatever level of complexity or input is used, the assessment of the risk should be reflective of its impact on achievement of business objectives, or the level at which exposure will impact on the business. While preferable to define the latter in financial terms, this is often difficult to achieve across the breadth of the organisation, although critical in some areas like Trading where internationally recognised mark-to-market processes should be applied. Clearly, in order to correctly identify the level of impact, one has to understand the business and the contribution of each element thereof to success. One big danger identified through practical experience is that business areas sometimes uses the process of risk management to elevate the status of their contribution by taking account of all consequential losses from a failure or risk. To prevent this, it is suggested that only the direct impact of losses or opportunities are accounted for.

From international statistical data consequential loss can be 3 to 4 times greater than the direct impact. The inclusion of consequential loss must be closely evaluated as the extent of cascading

impacts to be considered as dependent on the entity being assessed (e.g. state, parastatal, private company, individual, etc). If consequential loss is to be included all aspects should be included (environmental, social, quality, assets, economic, safety, etc). Mitigation for consequential loss can be by means of insurance policies and should be considered where quantitative probabilistic analysis can be undertaken. Care should however be taken when implementing mitigation strategies that the impact of consequential loss is not overstated to justify the cost of the strategies adopted.

A second interesting observation is the eagerness to account for the exposure as if the mitigation strategy has already been implemented, even if it has only been formulated. Such premature 'accounting' for mitigation will obscure the true risk exposure. The likelihood (probability and frequency) assessment needs to be sufficiently responsive to changes in the expectation of when an event is expected and with what level of assurance. Some organisations / functions prefer to separate the elements for a more exact empirical assessment. However, in general risk management is often not necessary in that it is important to understand whether such an event is likely to impact the organisation within the current financial year, the planning period, or beyond.

Depending upon the approach selected, i.e. assessing against Impact and Likelihood (2 dimensional model), versus assessing against Impact, Probability and Frequency (3 dimensional model), the following type of scale can be used:

**Table 2**  
**Impact Assessment**

Impact Level	Organisational Impact Level	Impact Description
10	Beyond Company, National and International	<ul style="list-style-type: none"> <li>Business/community disruption impact beyond the organisation</li> <li>Potentially disastrous impact on the financial sustainability of the organisation</li> </ul>
9	Beyond company – Regional	<ul style="list-style-type: none"> <li>Single event with direct financial impact &gt; \$1.0bn</li> </ul>
8	Across Company Divisions – National and International	<ul style="list-style-type: none"> <li>Company-wide/multi divisional business disruption</li> <li>Significant Impact on Profitability or business delivery capability of the organisation, or financial health of any single division</li> </ul>
7	Across Company Divisions – Regional	<ul style="list-style-type: none"> <li>Multiple fatalities or asset unavailability</li> <li>Single event with direct financial impact &gt; \$250m and &lt;\$1.0bn</li> </ul>
6	Divisional Impact – National and International	<ul style="list-style-type: none"> <li>Normal business operations of a division disrupted, but impact can be managed within the division without spillover into other divisions</li> </ul>
5	Divisional Impact – Regional	<ul style="list-style-type: none"> <li>Negative impact on efficiency and effectiveness of business operations, including not achieving regulated return</li> <li>Single event with direct financial impact &gt;\$100m and &lt; \$250m.</li> </ul>
4	Business Unit Impact – High	<ul style="list-style-type: none"> <li>Disruption of normal business operations of a unit (power plant, transmission or distribution districts, functional area)</li> <li>Impact can be managed within the unit without spillover into other units</li> </ul>
3	Business Unit Impact – Low	<ul style="list-style-type: none"> <li>Will have a negative impact on efficiency and effectiveness of business operations, including cost management</li> <li>Single event with direct financial impact &gt;\$20m and &lt; \$100m</li> </ul>
2	Departmental Impact – High	<ul style="list-style-type: none"> <li>Disruption of normal business operations of a business area</li> <li>Impact can be managed within area without spillover into other business areas</li> </ul>
1	Departmental Impact - Low	<ul style="list-style-type: none"> <li>Will have a negative impact on efficiency and effectiveness of business operations in that area, including cost management</li> <li>Single event with direct financial impact &lt; \$20m</li> </ul>

Financial values 5-10 to be determined by the board. Financial Values 1-4 to be determined by the division.

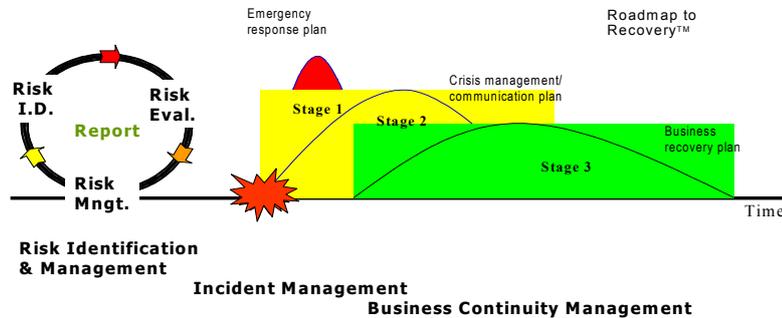
**Table 3**  
**3-Dimensional Model**

Probability	Frequency
10 Will definitely occur	Once a month
9 Will probably occur	Once in 6 months
8 Might well be expected	Once a year
7 Event can occur	Once in 2 years
6 Possible	Once in 5 years
5 Unusual, but possible	Once in 10 years
4 Conceivable but unlikely	Once in 20 years
3 Highly unlikely event will occur	Once in 30 years
2 Remote (has happened somewhere)	Once in 50 years
1 Ignore, event is negligible	Once in 100 years

**Table 4**  
**2-Dimensional Model**

Likelihood
10 The event is likely to occur within the next month.
9 The event is likely to occur within the next 6 months
8 The event is likely to occur within the next year
7 The event is likely to occur within the next 2 years
6 The event is likely to occur within the next 5 years
5 The event is likely to occur within the next 10 years
4 The event is likely to occur within the next 20 years
3 The event is likely to occur within the next 30 years
2 The event is likely to occur within the next 50 years
1 The event is likely to occur within the next 100 years

Figure 1  
Spectrum of Integrated Risk Management



### 3.2 Likelihood Assessment Alternatives

The qualitative rating scales below can be altered to a more quantitative scale where the predictions of probabilistic parameters are readily available. This scale could be a logarithmic or linear scale. An example of this for the Probability scale could be 1,0; 10-1; 10-2; 10-3; ...10-9.

This approach is much more acceptable to the mathematical minded and reduces the ambiguity of the textual descriptions of the ratings. In addition, the frequency or time before event could be reduced to a numerical rating thus giving the Three Dimensional Model risk assessments a mathematical formula of loss x probability x time before event. Typically this type of approach will be followed in the trading environment where the application of Value at Risk methodology is common practice. In the general production environment qualitative methods, informed by expert knowledge and experience, provides sufficient understanding of risks and the required mitigation measures. This brings one to the relationship between Enterprise Risk Management and Business Continuity Management (BCM). Typically an event that has a very low likelihood of occurrence may also have a very high level of impact.

Thus while such events / risks may score low on an impact x likelihood metric based ranking, the impact in the event of realisation is likely to be catastrophic to the organisation. It has therefore been recognised that a more formal relationship

needs to be established between ERM and BCM. It is useful now to consider the full spectrum of ERM, which can be demonstrated by the above diagram.

Risk Identification, Evaluation and Management are therefore a process directed at decreasing the likelihood of an unpredictable outcome, and also to decrease the relative impact of an unpredictability event, should it occur. Despite our best effort though, some events can be either beyond our control (floods or earth quakes) or cannot be fully managed away (fire). For such events one would require some form of pre-determined emergency processes and business recovery strategies, with the ultimate objective of re-establishing business capability within the shortest possible time and with minimum human casualty, financial and sustainability impact on the organisation and the environment. It is therefore advisable to clarify risk management strategy up front to ensure that the risk assessment and management process cover both prevention / reduction of exposure and recovery processes post an event. This is the point at which risk assessment and risk management strategy can be brought together in the risk assessment model.

While it is recognised that a 2 dimensional risk assessment methodology (impact X likelihood) is a subset of the 3 dimensional model (impact X probability X frequency), application of either can produce acceptable results, provided that those who are using the model recognises its limitations, or can deal with its complexity. The integration of risk management strategy into the assessment model can however most readily be demonstrated by making use of the 2 dimensional option.



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