

BWEA H&S 07



HEALTH AND SAFETY SEMINAR
26 APRIL 2007 GLASGOW UK



GE imagination at work

ScottishPower

renewables



working in support of your business

H&S Managers “Top 10” ~ 06/07

Alan Chivers

Executive Director, **PMSS**

Presentation to BWEA membership

26 April 2007, Glasgow, UK

www.pmss.co.uk

Top 10 - Intro

- Through the eyes of an H&S Manager.
- Data derived from projects where **PMSS** have been actively involved.
- Given in the spirit of experience / knowledge sharing.
- Covers aggregate exposure hours of approximately 2 million.
- Covers UK, Ireland & Holland; Onshore & Offshore.
- Any specific questions to ajc@pmss.co.uk

Top 10 - Agenda

- Performance
- Accidents & Incidents
- Authorities
- Legislation
- BWEA Guidelines
- Topical Issues
- Design Risk Analysis
- Competence & Resources
- Behavioural Programmes
- Management

Top 10 – Performance

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- The bar is set offshore – **Zero LTI** - has been achieved consistently over 06/07.
- Significant milestone for the offshore wind market.
- Should be specified as a requirement – we know its achievable !



Top 10 – Accidents & Incidents

● Accidents & Incidents we are regularly seeing:-

- RTA
- SSE's
- Falling Materials
- Lifting operations and equipment

- Hand injuries
- PPE discipline
- Rule breaking
- Small tools
- Reluctance to adopt eye protection
- Inappropriate reporting

Top 10 - Authorities

- Good relationships.
- Good participation.
- The “Ringing around syndrome”
- Cry for consistency.
- Lots of relevant experience to call upon



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Top 10 - Legislation

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● Appropriate Legislation

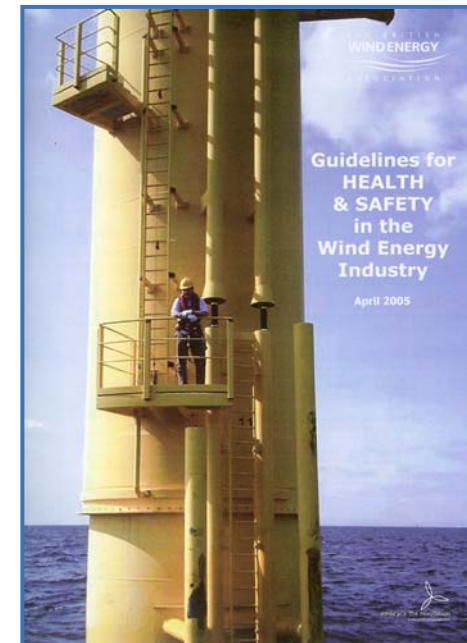
- CDM 2007 – CHSW.
- Diving at Work.
- DSEAR.
- Regions of Immaturity.



Top 10 – BWEA H&S Guidelines

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- Is a benchmark – requires frequent maintenance.
- Overly prescriptive in places.
- Some gaps – access – egress / competence / design / other marine technologies / interfaces / behavioural programmes.
- Tools rather than rules.



Top 10 – Topical Issues

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- Access & Egress
- Emergency Response
- Marine Rules
- Due Diligence Pitfalls



Top 10 – Design Risk Analysis

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- Willingness to engage – happening too late.
- The “commercial secret” card.
- Lack of consistency in processes.
- Get the message right down to shop floor.



Top 10 – Competence & Resources

- Still engaging Contractor at or near the insolvency line.
- Not fully understanding that resources include time and money.
- Lack of consistency in processes.
- Sub & sub-sub contracts getting missed.

Top 10 - Behavioural

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- Behavioural Programmes
 - Proven to reduce accidents and incidents by 40%
 - Being introduced in top tier Contractors wind contractors.
 - BAU for offshore – including sub-contractors.



Top 10 - Management

- Management
 - Lessons learnt processes improving and really carrying key issues (& solutions) forward.
 - Lost opportunity by late engagement.
 - HSE professionals generally of high calibre – but simply not enough of them !
 - Focus on risk – minimise paperwork – use your influence – specify where your bar lies.



Contact

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Alan Chivers

Executive Director

Broadwater House
Broadwater Road
Romsey
Hampshire. SO51 8GT

AJC@[pmss.co.uk](mailto:ajc@pmss.co.uk)

www.pmss.co.uk



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thank you for listening...

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GE Energy: Global Supply Chain- LOGISTICS

Embedding Safety into Wind Projects Delivery Process






Mike Boyce

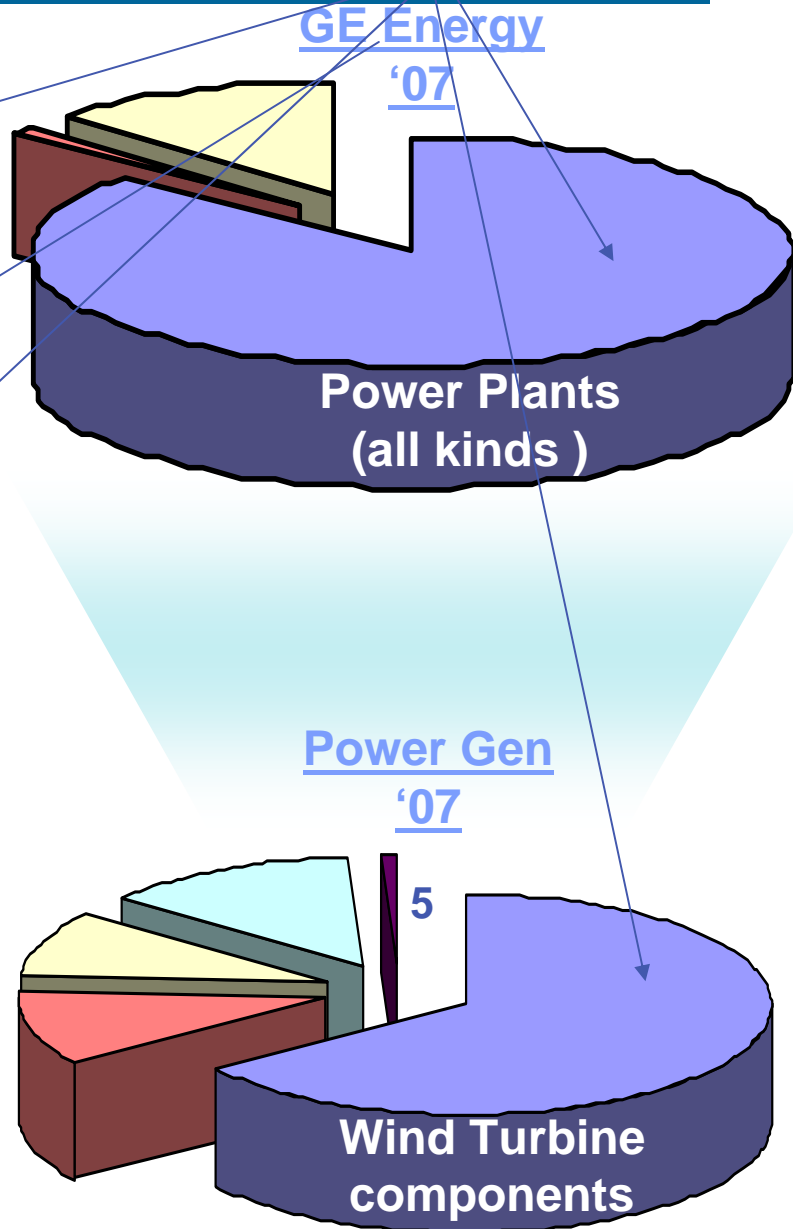
Global EHS Manager, GE
Power Generation, Global
Logistics



imagination at work

Logistics Activity: Where the volume is

Mode	%
 Trucks	45
 Maritime	25
 Global Air	20
 Express Parcel	5
 Rail	5



What can go wrong?

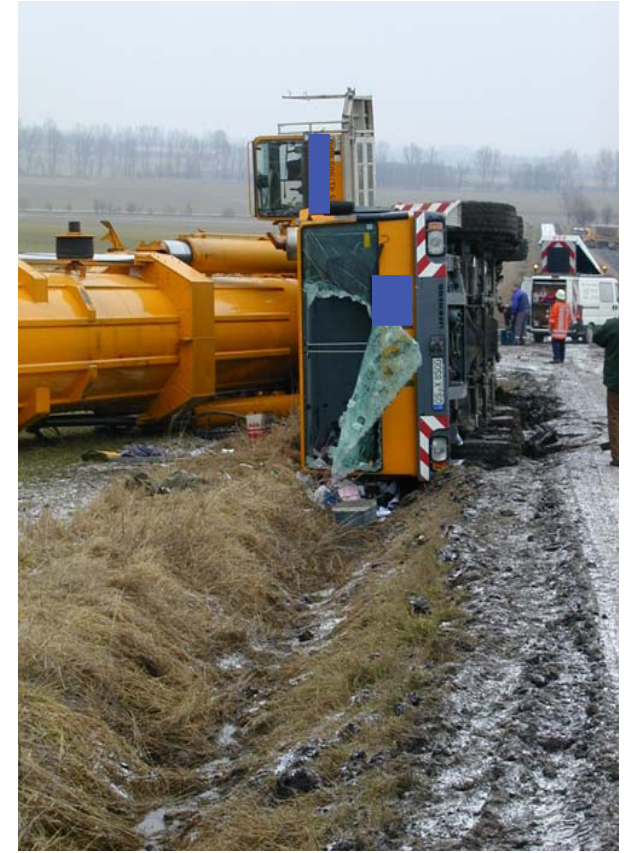
Injuries

Damage

- > Delivery
- > On-site transportation
- > Unloading
- > Installation



Fatal Accident to Contractor (non- UK)



Accident Description: Mobile crane was being driven by the contractor between work location on site (public roads) when it overturned. The driver received injuries to his upper body, and was removed from the scene by the emergency services. It is not known whether the driver was wearing a seat belt. Suspect: boom extended, query speed (additional factors)

Root Causes: Initial investigation indicates that one side of the road collapsed as the crane was being driven over it. The customer is responsible for the roads meeting a specification supplied by GE.



Examples of Global Events (over several years)



Where are the Risks?

Loading / Unloading:

- Several events have occurred when components were being loaded or unloaded from transport vehicles
- Key Safety Measure: Keep personnel not directly responsible for task away from work area



At the site (collection, delivery, factory or project)

Security processes: report in. Follow instructions

Driver behaviour: stay with vehicle

PPE: Wear it

Smoking: only where permitted

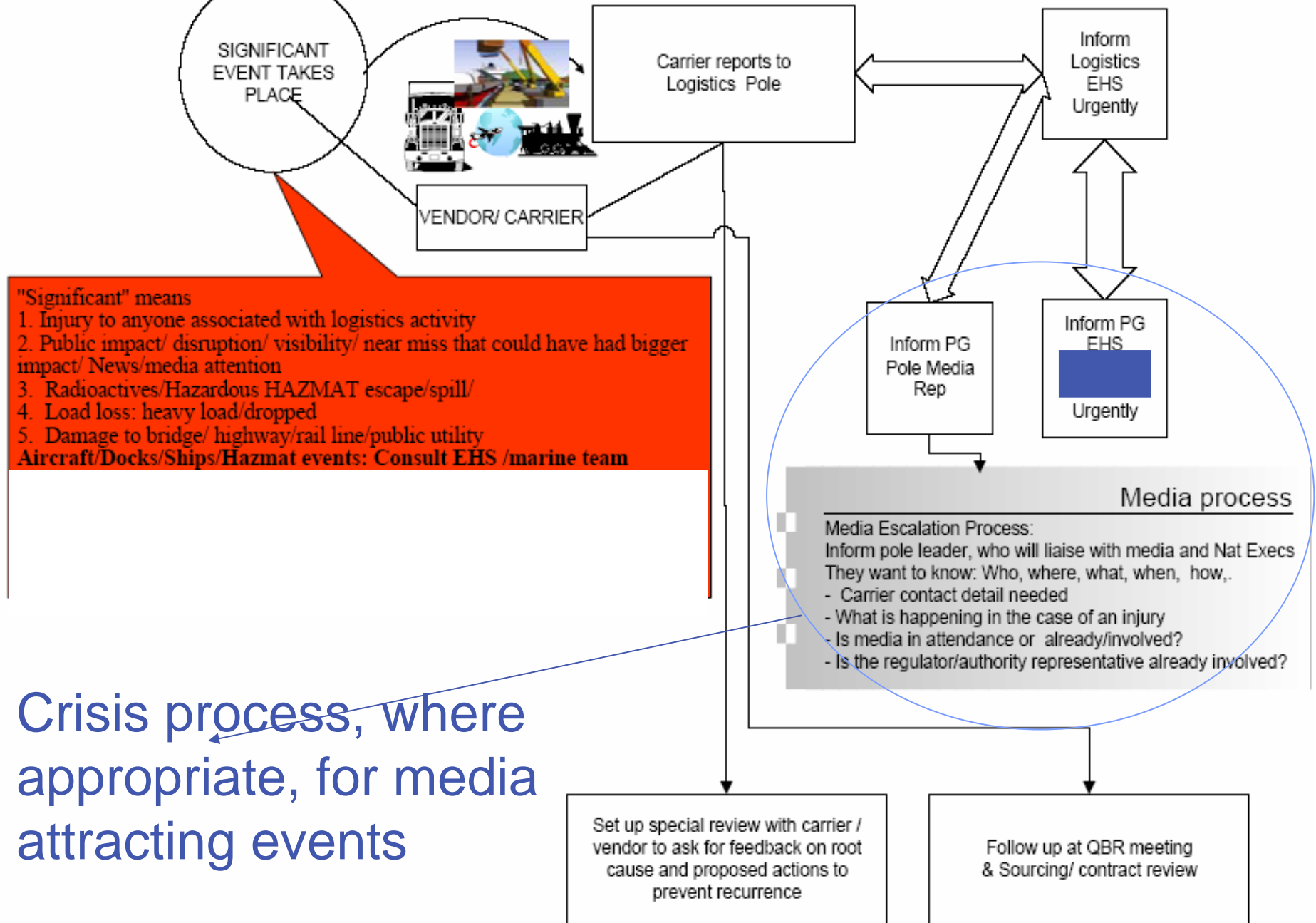
Emergency processes: follow site rules

Safe loading & unloading precautions

Safe work at height

Measuring: Events/ accidents/ near misses

Events Escalation



"Significant" means

1. Injury to anyone associated with logistics activity
2. Public impact/ disruption/ visibility/ near miss that could have had bigger impact/ News/media attention
3. Radioactives/Hazardous HAZMAT escape/spill/
4. Load loss: heavy load/dropped
5. Damage to bridge/ highway/rail line/public utility

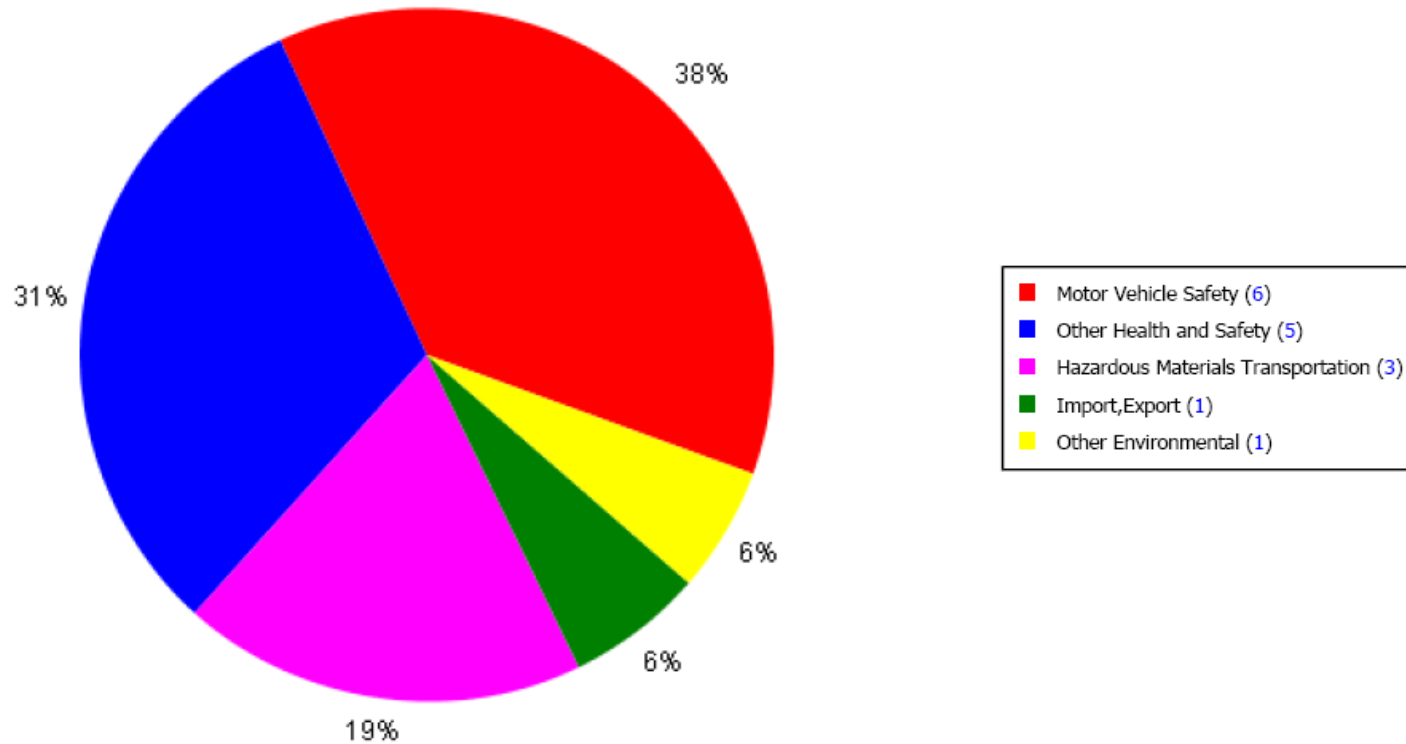
Aircraft/Docks/Ships/Hazmat events: Consult EHS /marine team

Crisis process, where appropriate, for media attracting events

Analysing Events

Events by Category

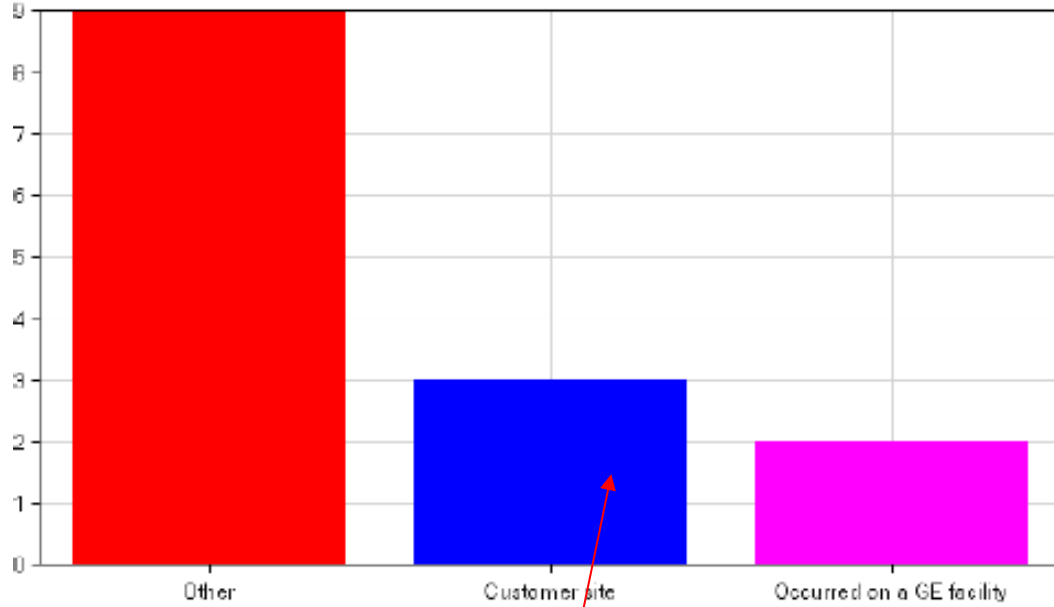
Criteria: Date Range = 1/1/2007 to 04/01/2007



Total number of records evaluated = 16.

Events By Occurrence Location Type

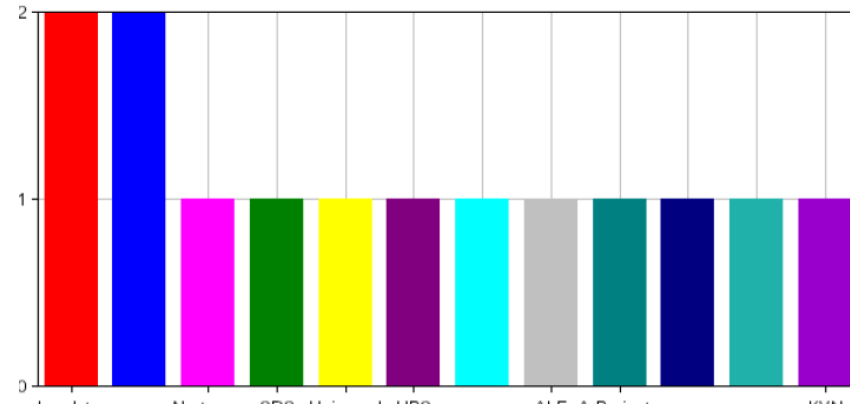
Criteria: Date Range = 1/1/2007 to 1/1/2008



Not the way to
impress our
customers!

Events By Dept

Criteria: Date Range = 1/1/2007 to 1/1/2008

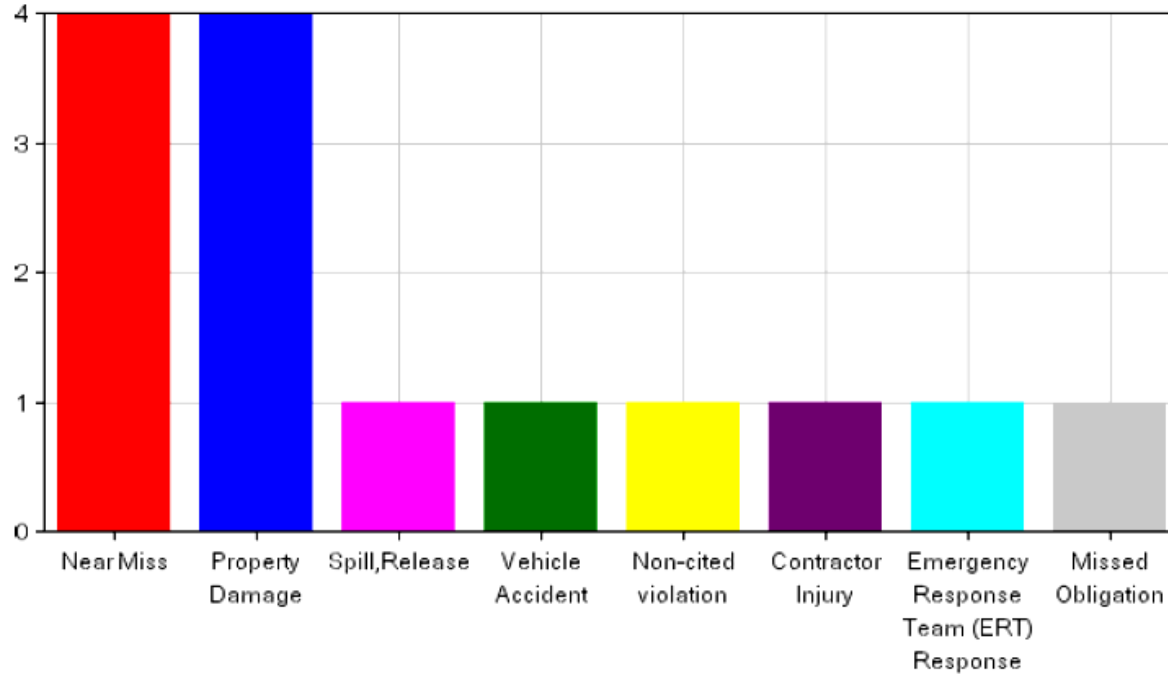


Carriers "to blame"

Events 07

Events By Type

Criteria: Date Range = 1/1/2007 to 1/1/2008



Carrier Management

Online safety questionnaire (qualification process)

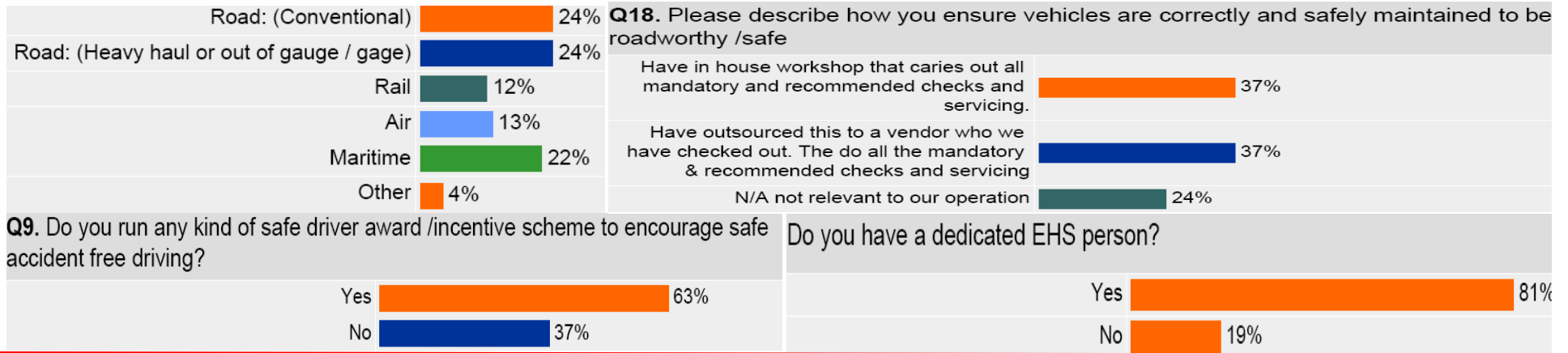
GE EHS policy support sign-up

Events escalation & reporting



**Next: Environmental- CO₂ Emissions Reduction:
Fuel etc**

Carrier Management

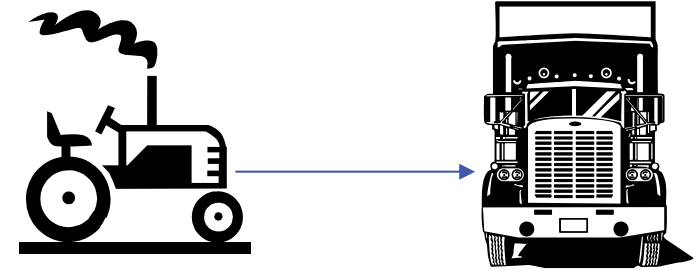


Screening

Sign up to EHS Policy

Follow up on performance

Roads or Tracks: Where are the Risks?



Site Roads:

- Site roads have been created issues for safe transportation of components
- Key Safety Measure: Road Assessments should be done through

Another Contractor fatality (non-UK)

A Crane Company's 90 ton crane (contracted to the customer) was running on a road heading to a WTG Pad, road did not support the crane load and crane flipped over. Crane Operator became entrapped inside the cab.

Contributing Factors:

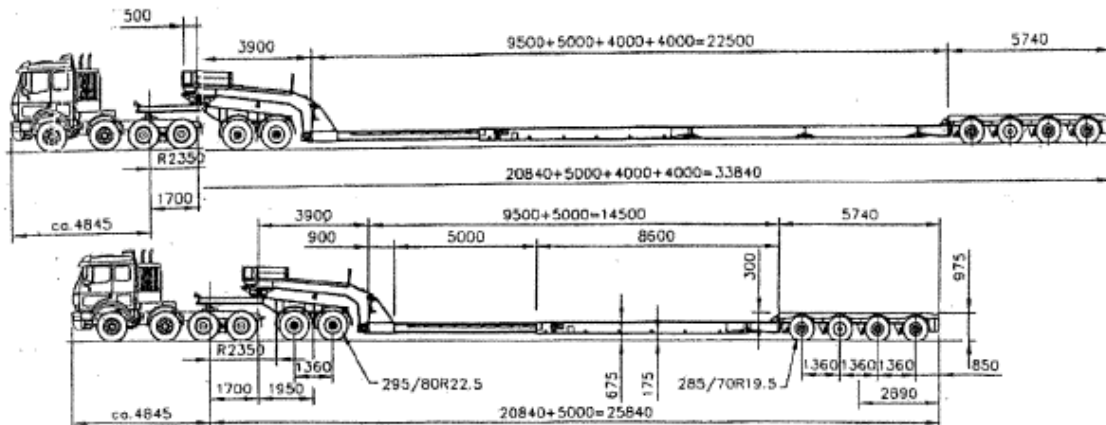
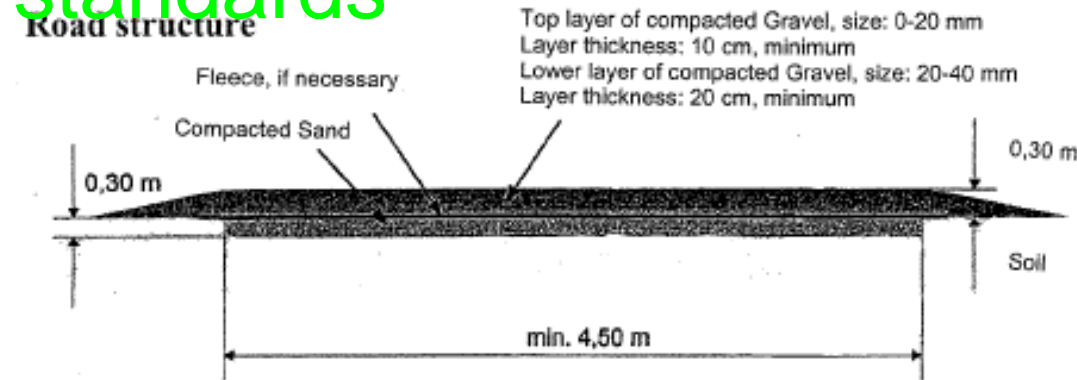
- The road did not support the load of the crane.



Roads Specifications: Cranes & Trucks

Extracts from GE standards

Road structure



Width of Finish road (min: 16 feet – 4.8 m):
Width of Crane travel path (min: 35 feet – 10.7 m):
Grade (max: 10 %):
Crest ○



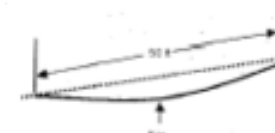
No Crest ○



Leveled side to side (max 1 %):
No dip ○



On flat terrain, how many 6 in – 15.2 cm dip on 50 feet – 15.2 m :



Conclusions

Preparation & Planning

Monitoring

Discipline

Tracks /Roads

Pre planning

Maintenance

Rescue (stuck vehicle)



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Offshore Safety from the System – a project SAP & commissioning perspective

Simon Burnett, Electrical Engineer

PMSS Limited

26 April 2007, Glasgow, UK

www.pmss.co.uk

Aim of this Presentation

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- To explain a common standard for electrical “Safe Systems of Work” related to offshore wind farm generation to comply with UK and European legislation and HSE requirements.
- To illustrate how electrical “Safe Systems of Work” on offshore wind farm generation sites must be consistent and of an acceptable standard

UK 4th Edition Safety Rules

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- Conceptualised in the early 20th Century
- Setup by the Central Electricity Generating Board
- Modified through lessons learnt
- Complete set of Operational Rules
- Provide the fundamental basis for “Safety from the System”

Safety from the System

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- Must represent best practices, from which it will self-evolve
- Must provide guidance to ensure high standards of safety are practiced throughout
- Must be transparent, user-friendly, and auditable
- Customised to fit site requirements
- Complete set of safety rules and documents

Objectives

- Create an open forum for discussion of the procedures laid out in the Safety from the System suite
- Provide a view to implementing Safe Systems of Work to cover the complete transition from the Construction Phase (DEAD) to the Commissioning Phase (LIVE)
- Further provide a Safe System of Work during the Commissioning Phase up to Test On Completion (TOC) and hand-over

Review before Adoption

- Ensure that correctly Trained and Qualified personnel are in place to operate and control the Safe Systems of Work and Safety from the System suite.
- Ensure that suitable in-house training systems are in place to achieve the goals and aims of the project
- Ensure that the GRID or DNO is satisfied with the training, staff, systems, and procedures to operate across the responsibility boundary or EPOS (Electrical Point of Supply) as agreed

Training Objectives

- Provide sufficient training and information for the Certification of Competent and Authorised Persons in line with the Safety Rules and Training Procedure
- Following training, the Person will possess sufficient knowledge to understand the Safety Rules and Document Application Procedure, will know their responsibilities, and the ACCOUNTABILITY incumbent upon them as a Competent or Authorised Person

Application

- The Safety Rules shall be applied to the project's Windfarm Substation Switchboard, SCADA room, all onshore and offshore HV switchgear, LV and Mechanical systems within WTG towers and nacelles, all cables and associated equipment
- A clear definition of the Grid and Windfarm boundaries will be applied to apparatus and equipment that fall under the Grid and Windfarm Safety rules

Documentation

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- Codes of Practice
- Safety Rules
- Safety Rules Clearance Certificate (SRCC)
- Safety Document Application Procedures (SDAP)
- Certificate of Isolation & Earthing (Cert. of I&E)
- “Competent Person” & “Authorised Person” Training Procedures

Codes of Practice

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A guideline to good practices running alongside the Safety Rules, Work Plans, Method Statements, and Risk Assessments. Covering:

- High Voltage Switching
- Earthing of High Voltage Equipment
- Access to High Voltage Equipment
- Testing of High Voltage Equipment
- Working on Low Voltage Apparatus
- Remote Controlled Equipment
- Working in Confined Spaces
- Working on or near High Pressure Equipment

Safety Rules

- Provided to ensure persons working on plant or apparatus are safeguarded from inherent hazards contained in electro-mechanical systems
- Are MANDATORY
- Impose duties to take care for themselves and others
- Support a Company H&S Policy
- May be supported by other Authorities' procedures

The logo for SRCC (System Readiness Check Certificate) consists of the letters 'SRCC' in a bold, blue, sans-serif font. The background of the slide features a decorative graphic of many thin, blue, wavy lines that curve across the top and right sides.

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- To ensure that the system or any part of the system is sufficiently complete at the Construction Phase or is at an advanced stage of Construction to formally hand over from the Construction Phase (DEAD) to the Commissioning Phase (LIVE), and to be energised and put into service.
- Issued following collective agreement between Company Management and its Sub-Contractors that the Commissioning Phase can be entered

SDAP

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- Demonstrates in writing that the employer recognises its duties for the Health, Safety, and Welfare at Work of its employees and any other persons who may be affected by its activities
- Ensures that all employees and sub-contractors understand the requirements and means when a Safety Document is required, how to apply the Document, and how to clear it.

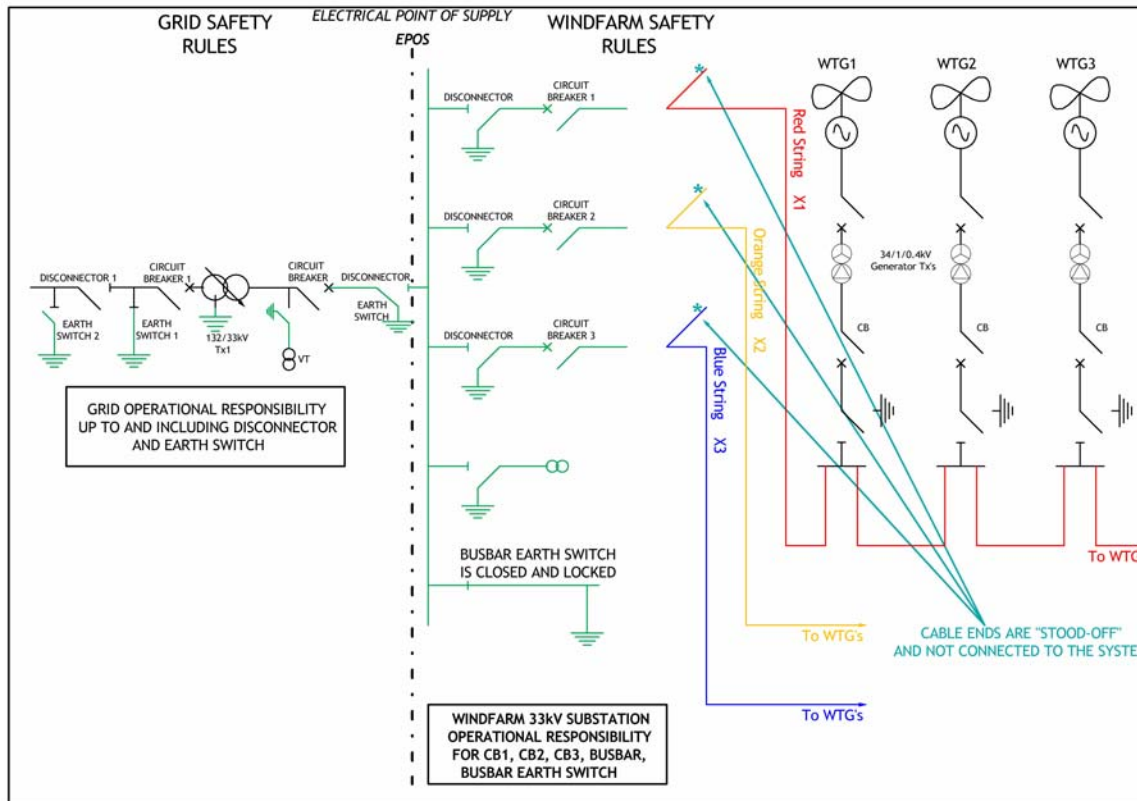
Cert. of I&E

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- Apply principles between the GRID or DNO and the Wind farm, and set down responsibilities of personnel operating and working on the System
- Operates across the defined boundary or Electrical Point of Supply (EPOS)
- Issued following collective agreement between Company Management and its Sub-Contractors that the Commissioning Phase can be entered
- Usage restricted to Control or Senior Authorised Persons in conjunction with GRID or DNO Control Room operatives

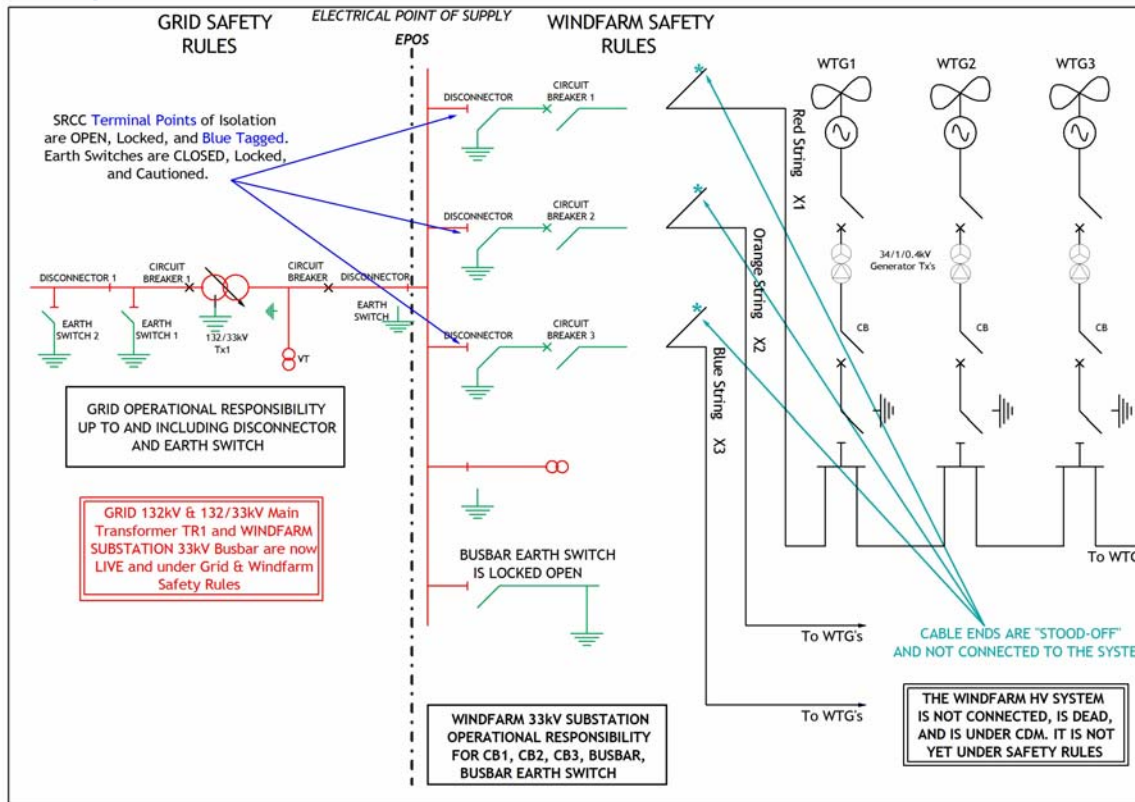
Cert. of I&E – Typical Application

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Cert. of I&E – Typical Application

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The GRID/DNO and Wind farm shall energise the Wnd farm 33kV Substation busbar without affecting the continuation of Wind farm Construction activities

The Wind farm Control/Senior Authorised Person will establish the SRCC Terminal Points at the Substation Switchgear 33kV Disconnectors.

The Earth Switches and Circuit Breakers shall be closed, locked, and Caution Notices posted.

The 33kV Shore-link Cable Ends shall be left “stood-off” at the switchgear and shall be fitted with Pfisterer Terminations for insertion into the switchgear as the project program dictates

Competent Person

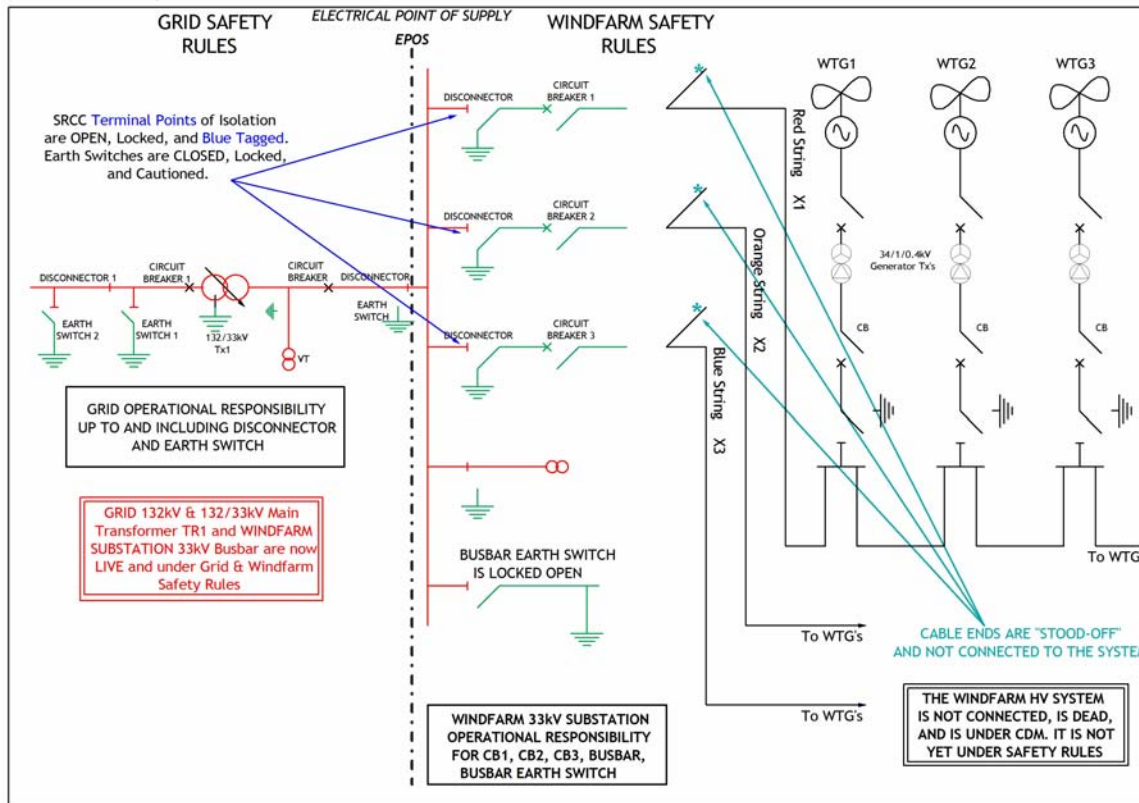
- As defined in the Safety Rules, a Competent Person (CP) is:
A Person who has sufficient technical knowledge and/or experience to enable him to avoid Danger and is nominated by a Senior Authorised Person (SAP) to undertake responsibilities appropriate to his knowledge and/or experience which may include receipt and clearance of Safety Documents
- Competent Persons shall demonstrate an ability to correctly work within the confines of the Safety document application procedure

Authorised Person

- An Authorised Person (AP) is: A Person suitably trained and subsequently authorised by an appropriate officer of the windfarm to carry out duties specified in writing, including preparation, issue, receipt, clearance, transfer, and cancellation of Safety Documents, and be responsible for the release of Plant and/or Apparatus for work and Testing. To carry out HV/LV electrical and mechanical isolations
- Authorised Persons shall demonstrate a complete understanding incumbent upon them to Isolate HV/LV Electrical and Mechanical Systems associated within the complete Windfarm and issue Safety Documents to provide a Safe System of Work to all persons working on or near Plant and Apparatus

33kV Back Energisation Objectives

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The example explained in this presentation is for the Red String 1, and is typical of Orange String 2 and Green String 3

- The HV Distribution System shall be set up, the SRCC released and then Back Energise the Windfarm Red String 1 with 33kV from the Windfarm Substation Circuit Breaker CB1 out to the WTG Switchgear and up to WTG 1 Nacelle HV Transformer.

- System then soak-tested for 24 hours.

- Remainder of WTG nacelle transformers on the String will be SRCC released and energised individually to prevent stress on the string, and to safeguard the GRID by posting a "Risk of Trip" with the grid control room, then left on soak test for up to 24hrs

Future Safety Rules

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- Lessons learnt from Scroby Sands, Kentish Flats, Egmond an Zee, and Burbo Bank are to be integrated into future suites of Safety Rules documents.
- Future sites to adopt Safety from the System documentation based on documentation initially produced for the wind farms stated above.



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Thanks For Listening !

**Offshore Safety from the System – a
project SAP & commissioning perspective**

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Graeme Cooper

Head of Grid, Health and Safety
and Technical Affairs

graeme@bwea.com



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