Risk Assessment and Command Staff Exercises as Method to reduce Vulnerability of Offshore Wind Farms

Offshore Wind R & D Conference
Bremerhaven

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# Topic

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Background</td>
</tr>
<tr>
<td>2</td>
<td>Risk Assessment – Model and Procedure</td>
</tr>
<tr>
<td>3</td>
<td>Command Staff Exercises</td>
</tr>
<tr>
<td>4</td>
<td>Conclusions</td>
</tr>
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<tr>
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</tr>
<tr>
<td>4</td>
<td>Conclusions</td>
</tr>
</tbody>
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Offshore Wind Farms

- Part of Critical Infrastructure;

- Operators are focusing on reducing vulnerability;

- Research project „OWiSS - Offshore wind farms Safety and Security“ - supported by German Federal Ministry of Science and Education;

- Objective: Systematic investigation of vulnerability of offshore wind farms
1  Background

2  Risk Assessment – Model and Procedure

3  Command Staff Exercises

4  Conclusions
Risk Sources

Risk coming out of environment

Risk coming out of system

Elements
Model of Damage

Hazardous situation

Event/ Attack

Hazard/ Threat
Asset

Occurrence of damage
Damage
Risk
Methodical Approach

Define the system
System „Offshore Wind Farm“

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Methodical Approach

1. Define the system
2. Identify hazards and threats (Process)
3. Develop possible scenarios (ETA)
4. Estimate likelihood and damage
5. Evaluate unacceptable scenarios
# Evaluation

## Damage done to assets

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Damage (D) in Euro</th>
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<tbody>
<tr>
<td>high</td>
<td></td>
</tr>
<tr>
<td>medium</td>
<td></td>
</tr>
<tr>
<td>seldom</td>
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## Hazards and Threats - Results

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<tr>
<th></th>
<th>Threats</th>
<th>Hazards</th>
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<tbody>
<tr>
<td>Number of events</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>Number of scenarios</td>
<td>129</td>
<td>89</td>
</tr>
<tr>
<td>Number of not acceptable scenarios</td>
<td>105</td>
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Hazards and Threats - Examples

Collision with Platform

- Blackout
- Damage to converter and transformer platforms possible

Damage to Cable by anchoring

- Blackout
- Maintenance & Repair

Quelle: H&M ing. Büro
Quelle: www.rwe.com
Topic

1. Background
2. Risk Assessment – Model and Procedure
3. Command Staff Exercises
4. Conclusions
Preventive Measures - Focus

1. **Proactive measures**
   means to prevent damage or reduce risk

   - Threat
     - Protection
     - Detection
     - Action

   - Hazards
     - Technique
     - Organization
     - Person

2. **Reactive measures**
   means to eliminate the damage as quick as possible
Case Studies - types

- Simulation games
- Case Studies
- Command Staff Exercises
Command Staff Exercises - Method

- Method: Exercise of an Emergency under guidance of experts;
- Scenario: Employees staying on a platform becoming seriously ill.

Quelle: OWiSS-Team HS BHV
Command Staff Exercises - Results

- Different emergency plans makes target-oriented action difficult;
- Different composition of command staff leads to incorrect communication.
Topic

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4. Conclusions
Conclusions

- Offshore wind farms are facing several risks;
- Research project „OWiSS“ provide a systematically approach on risks;
- Besides proactive measures vulnerability can be reduced by optimizing emergency management of operators.
Thank you for attention!

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