



FIRE SAFETY IN HIGH HAZARD INDUSTRY
GOOD PRACTICE EXPLAINED

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INDUSTRIAL FIRE SAFETY IS A SYSTEM

- ISO/IEC/IEEE 15288 standard for life cycle of systems created by humans. Firefighting system are made up of:
 - Construction(s)
 - Organisational aspects
 - Installations (fixed, mobile, semi-mobile)
 - Foam for fire fighting (discussed in more detail later)
- Firefighting foam can be applied by fixed (automatically activated), mobile or a hybrid (semi-fixed) installation
- Credible incident scenarios are the foundation in the process to achieve the systems goals and objectives

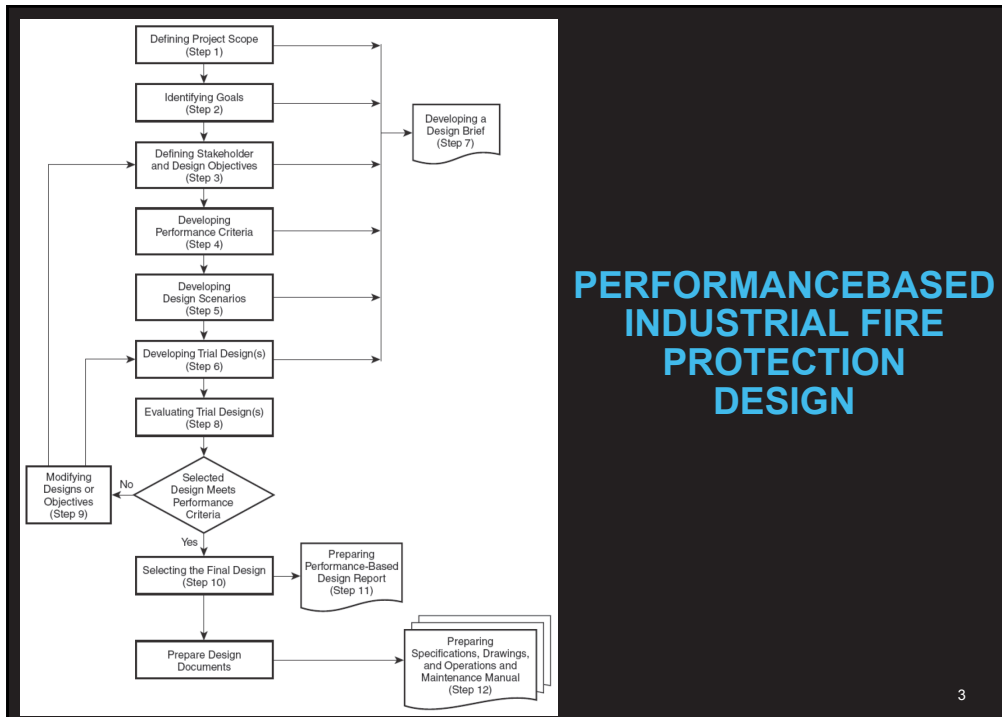
FIRE PROTECTION DESIGN

Performance based process Design Process:

- All previous lines of defence (LoD) were breached
- Fire safety - last barrier between controlled incident and uncontrolled situation
- Last LoD requires 99% availability & reliability of 99% at any moment during its technical life
- (Retro) acceptance testing, (retro) commissioning testing (baseline values), followed by periodic Inspection, Testing, Maintenance (ITM)

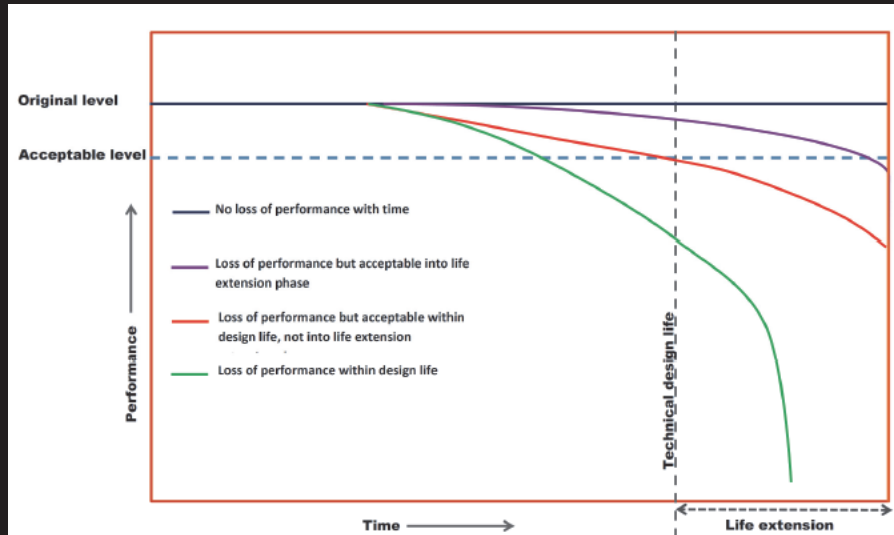
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AGEING ASSETS & INCIDENT FREQUENCY (1)



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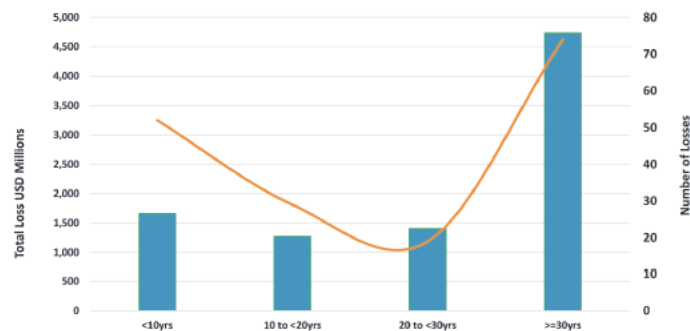
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AGEING ASSETS & INCIDENT FREQUENCY (2)

Analysis of Causes of Losses



Losses by Age of Plant – All Occupancies (2000-2015)**



Source: LSM OGPC Loss Database
 ** Nat Cat and Power excluded

SLIDE FROM PRESENTATION BY LIBERTY SPECIAL MARKETS

FIREFIGHTING FOAM LEGISLATION

- Ban on use of PFOA (C₈ Perfluorooctanoic acid) properties: persistent, bioaccumulative, toxic, carcinogenic properties under investigation

European legislation:

<http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017R1000>

- Foam concentrates (FC) containing PFOA are no longer available on market after June 2020
- Replacing FC is elaborate, difficult and expensive process

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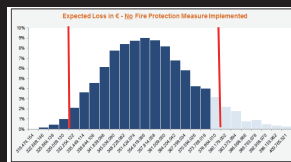
PREDICTIVE VULNERABILITY ASSESSMENT

Identify losses & associated costs

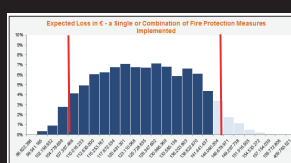
Item	Value	Description
1. Total value of the assets	200,000,000	The total value of the assets is the sum of the values of all assets.
2. Total value of the assets at risk	150,000,000	The total value of the assets at risk is the sum of the values of all assets that are at risk.
3. Total value of the assets protected	50,000,000	The total value of the assets protected is the sum of the values of all assets that are protected.
4. Total value of the assets at risk after investment	100,000,000	The total value of the assets at risk after investment is the sum of the values of all assets that are at risk after investment.
5. Total value of the assets protected after investment	100,000,000	The total value of the assets protected after investment is the sum of the values of all assets that are protected after investment.
6. Total value of the assets at risk after investment and protection	0	The total value of the assets at risk after investment and protection is the sum of the values of all assets that are at risk after investment and protection.
7. Total value of the assets protected after investment and protection	100,000,000	The total value of the assets protected after investment and protection is the sum of the values of all assets that are protected after investment and protection.
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Simulate total cost losses

BEFORE INVESTMENT
~375 x 10⁶ Euros

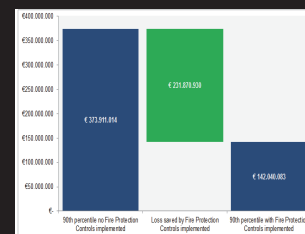


AFTER INVESTMENT
~142 x 10⁶ Euros



Costs

LOSS REDUCTION
~230 x 10⁶ Euros



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