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Education: - Maritime Navigator and Lead Auditor

Experience:



- Chief Officer in the merchant marine

- Crisis Management advisor at RelyOn Nutec
- Operations Manager at Esvagt A/S
- Director of HSEQ at A2Sea
- HSEQ Expert in Oil Gas Denmark

Now:

- Business Developer at DBI













"SAFER AND FASTER P2X" GUIDELINE



www.safeptx.dk



www.safeptx.dk

Welcome to the 'Safe and Faster PtX' Guideline Platform.

About DBI

'Safe and Faster PtX' is a collaboration under the Innomission II partnership, reporting to the Energy Cluster Denmark administration.

The nearly 200-page guideline is part of the "Safer and Faster PtX" project, launched in collaboration with FORCE Technology, and in partnership with Copenhagen Infrastructure Partners, DFDS, Dansk Standard, European Energy, Everfuel, Green Hydrogen Systems, Port of Rønne, Siemens Gamesa Renewable Energy and Skovgaard Invest.

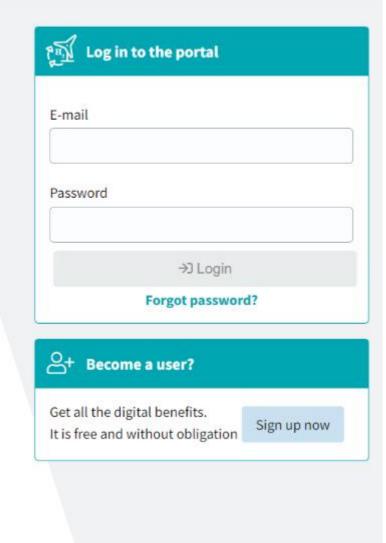
The guideline aims to improve safety and enable faster implementation of PtX production plants, by providing a comprehensive overview of recommended practices, relevant regulations, information on green fuel characteristics, societal perspectives, and more.

This digital tool offers solutions to challenges faced by many stakeholders in the Power-to-X industry.

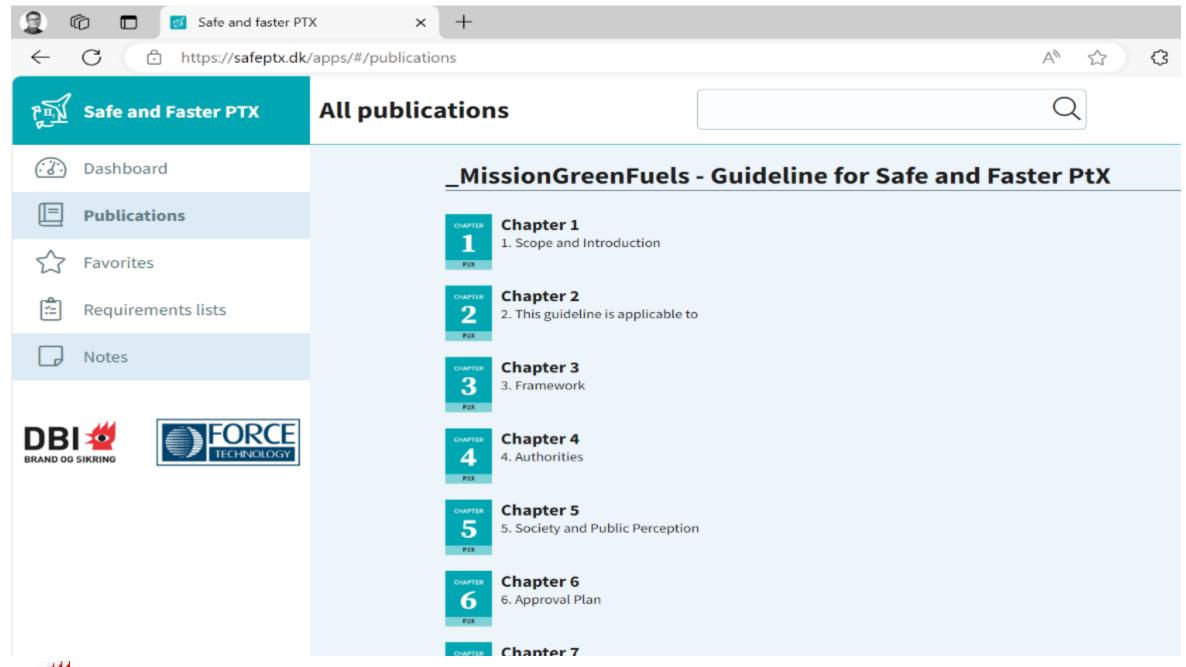
The platform makes it easier for you to navigate the content, which is freely available upon signing up as a user.

Once registered, you will have an easily accessible overview of the full guideline and appendixes, allowing you to search for information, save specific chapters and subchapters, and make comments.

When the platforms is updated, you will be directly notified via email – this way, you won't miss any new content.

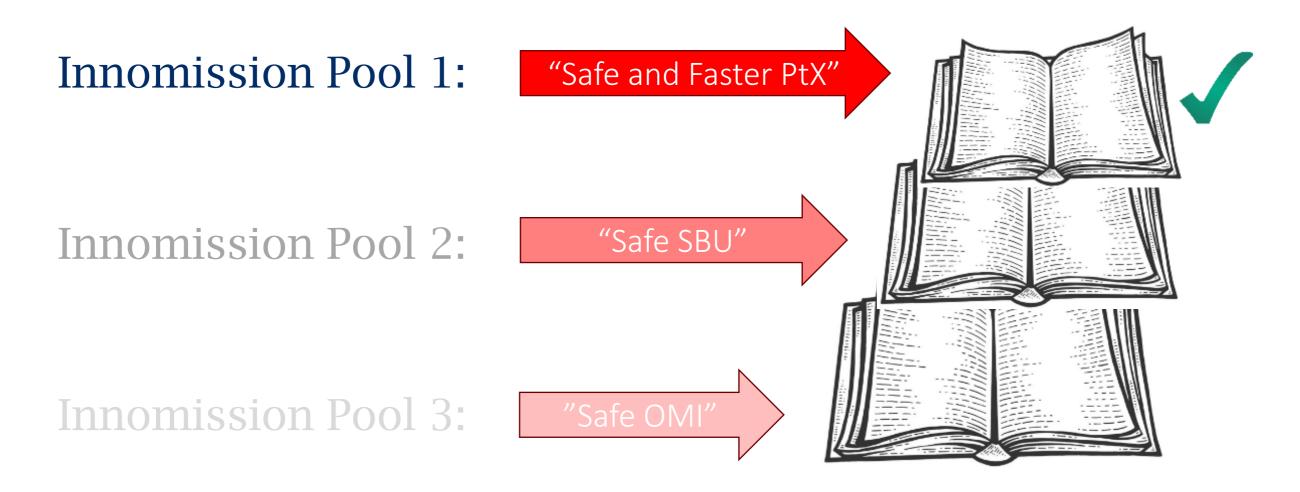






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"SAFE AND FASTER PTX - GUIDELINE"





- 1. SCOPE AND INTRODUCTION
- 2. THIS GUIDELINE IS APPLICABLE TO
- 3. FRAMEWORK
- 4. AUTHORITIES
- 5. SOCIETY AND PUBLIC PERCEPTION
- 6. APPROVAL PLAN
- 7. RISK MANAGEMENT AND ASSESSMENTS
- 8. GENERAL HSE (HEALTH SAFETY AND ENVIRONMENT)
- 9. COMPLIANCE WITH PTX RELATED REGULATIONS
- **10. CONSTRUCTION INTEGRITY**
- **11. GREEN-FUELS DATA AND CHARACTERISTICS**
- **12.** BIBLIOGRAPHY





1. SCOPE AND INTRODUCTION:

provide a guidance for best practice of the management of the safety in relation to establishing a Power-to-X plant.

2. APPLICATION:

The guideline is applicable to all industries and sectors that produce, handle or store green fuels, including producers, suppliers, authorities, branche unions, institutes, NGOs, and societies.

3. FRAMEWORK:

- Interviews of stakeholders
- Regulations and standards
- Studies related to Hazards, prevention, and public perceptions.



4. AUTHORITIES

- 4.1. Risk Authorities
- **4.2.** Municipal Departments
- 4.3. State Departments
- **4.3.1.** Danish energy Agency
- **4.3.2.** Danish Environmental Protection Agency
- 4.3.3. Danish Work Environment Authority
- 4.3.4. Danish Safety Technology Authority
- **4.3.5**. Danish Emergency Management Agency
- **4.3.6.** PET (Politiets Efterretningstjeneste)
- 4.3.7. Ministry Of Transport



5. SOCIETY AND PUBLIC PERCEPTION:

- 5.1. Why Society Matters
- 5.2. How Public Involvement Can Be Done
- 5.3. Example Of A Public Engagement Plan
- 5.4. Which are the benefits if we do it





CONTENT:

6. APPROVAL PLAN:

- 6.1. Overview Of Passed Approvals
- 6.2. Framework for Approvals
- 6.3. From Planning to Operation
- 6.4. Liase and lobby prior to Planning.
 - 6.4.1. Municipals
 - 6.4.2. Sociaty
 - 6.4.3. Infrastructure
- 6.5. Process and Approvals
 - 6.5.1. Phase 1. From idea
 - 6.5.2. Phase 2. Designing the concept
 - 6.5.3. Phase 3. Engineering
 - 6.5.4. Phase 4. Tender, and construction
 - 6.5.5. Phase 5. Operation and maintenance
 - 6.5.6. Phase 6. Decommission
- 6.6. Road to Approvals

Roadmap for regulatory interactions for Power-to-X facilities \bigotimes Ł Q ٩ KP2 Phase 1 Phase 2 Phase 3 Phase 4 Phase 5 Phase Operations & Maintenance Concept design Engineering Procurement & Decom-Construction mission R.1. Anmeldelse af projekt R.2. Ansegning om plangrundlag R.3. Miljøkonsekvensvurdering, §2 R.4. Mijegodkendelse, §33 R.5. Risikovurdering ved farlige stoffer, SEVESO R.6. Beskyttelse af kulturarv og arkæologiske interesser R.7. Brandmyndighedsgodkendelse R.8. Byggetilladelse R.9. Arbejdsmiljøtilladelse R.10. Affaldshåndtering og -bortskaffelse R11. Sårbarhedsvurdering ved PET R12. Nettilslutnings tilladels T.1. Spildevandshåndtering T.2. Emissioner til luften T.3. Trykbærende udstyr T.4. Elektriske installationer fechnical approvals T.5. Eksplosionsbeskyttelse, ATEX T.6. Elektromagnetisk interferens, EMC T.7. Støjregulering T.8. Maskindirektiv T.9. Overensstemmelseserklærin T.10. ATEX arbeidspladsvurdering T.11. Sikker transport of forligt gods, ADR T.12. Arbejdsmiljø og sikkerhed T.13. Energistyring og energieffektivitet T.14. Kemikaliesikkerhed, REACH, CLP D.1. Nedprocedurer D.2. Beredskabsplaner D.3. Brugsanvisninger og vedligeholdelsesvejledninger D.4. Risikovurdering D.5. ATEX-dokumentation D.6. Kemikaliesikkerhed D.7. Sikkerheds- og sundhedsplar D.8. Miljøgodkendelse D.9. Inspektions- og vedligeholdelsesdokume D.10. Jobbeskrivelse, certifikater og organogram D.11. Vagtplan for ordinaer drift D.12. Plan for eksternt beredskab 1.1. Trykbærende udsty 1.2. Eksplosionstarline Periodic atmosfærer, ATEX zoner according t nspections 1.3. Elektriske installatione regulatory 1.4. Brandsikringsforanstaltninge The roadmap is based on a large column 3 PtX 1.5. Alarmsystemer facility. All projects are different and specific

I.6. Kalibrering og verificering af flowmålere

1.7. Arbejdsudstyr

1.10. Arbeidsmilie L11. Kraner og løfteudstyr

1.8. Kemiske stoffer og materialer

1.9. Emissioner og affaldshåndterin

1.12. Ventilationssystemer og luftkvalitet

Regulatory appr

Documentation

project characteristics can result in great

This roadmap can be used as overview of

Please consult the Guideline for Safer and

Faster PtX for detailed information.

variation in the regulatory requirements

regulatory interactions.



7. RISK MANAGEMENT AND ASSESSMENT:

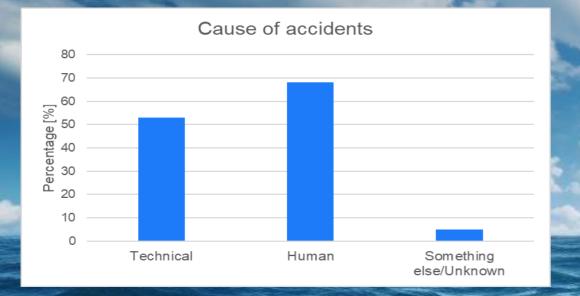
7.1. Fundaments for risk assessment

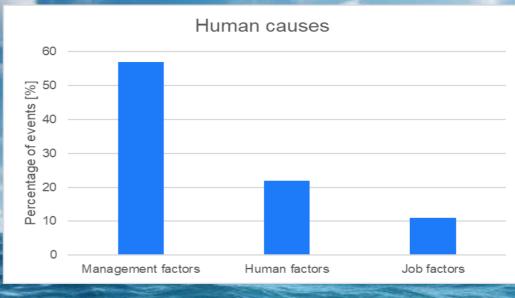
- 7.1.1. Risk assessment motivation
- 7.1.2. The purpose of the risk assessment
- 7.1.3. Who should be involved
- 7.1.4. Identifying interfaces
- 7.2. Risk assessment steps
 - 7.2.1. Identification
 - 7.2.2. How to identify hazards
 - 7.2.3. Analyses
 - 7.2.4. Evaluation
 - 7.2.5. Methodologies for analyses
- 7.3. Identifying interfaces for the assessment
- 7.4. Interfaces and boundaries of the risk assessment on different levels

Severity	Consequences				Increasing Likelihood				
					A	В	с	D	E
	People	Assets	Environment	Reputation	Never heard of in the industry	Heard of in the industry	Has happened in the organization or more than once per year in the industry	Has happened at the location or more than once per year in the organization	Has happened more than once per year at the location
0	No injury or health effect	No damage	No effect (no or temporary impact - days)	No impact (local media, no significant concern)	L	L	L	L	L
1	Slight injury or health effect (first aid or medical treatment)	Slight damage	Slight effect (local scale, short term damage – weeks)	Slight impact (short term local concern)	L	L	L	L	L
2	Minor injury or health effect (restricted work case or LTI)	Minor damage	Minor effect (local scale, short term damage – months)	Minor impact (short term national mention)	L	L	L	М	М
з	Major injury or health effect (partial disability)	Moderate damage	Moderate effect (local scale, medium terms damage – years)	Moderate impact (medium term national concern)	L	L	М	М	н
4	< 3 fatalities, or permanent total disabilities	Major damage	Major effect (local scale, long term damage – decades)	Major impact (regional or pensistent national concern)	L	М	М	High Risk (Formal Demonstration of ALARP required)	
5	> 3 fatalities	Massive damage / total loss	Massive effect (regional scale, permanent damage)	Massive impact (global concern and media coverage)	М	М	н	н	н

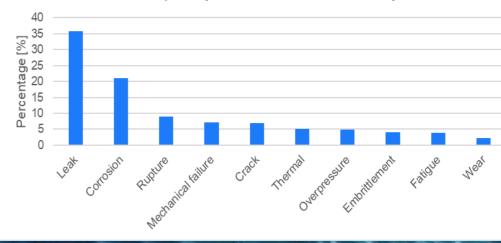


TECHNICAL VS HUMAN: (Data from HIAD 2.0)

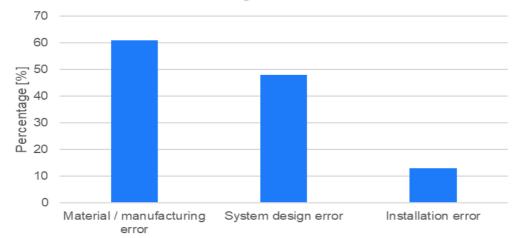




Relative frequency of mentioned failure keywords



Included among technical causes



8. GENERAL HSE

8.1. **PSS Plan** (during construction)

8.1.1. Example of a PSS Plan(Plan for Safety and Health)

8.2. Health, Safety and Environment Plan

8.2.1. HSE Plan (Example of a list of content for a HSE plan)

8.3. PPE (Personal Protection Equipment)

8.4. Environmental considerations

8.4.1. In general

8.4.2. Carbon emissions

8.4.3. Resource usage

8.4.4. Waste Management

8.4.5. Land use and habitat protection

8.4.6. Air quality

8.4.7. Energy efficiency

8.4.8. Transportation and logistics

8.4.9. Social and community Impact



9. COMPLIANCE WITH REGULATIONS:

- 9.1. Compliance
- 9.2. SEVESO Directive
 - 9.2.1. Background for SEVESO Directive
 - 9.2.2. Risikohåndbogen (Danish version of SEVESO Directive)
 - 9.2.3. The Danish implementation Order 372 from 25/04/2016
 - 9.2.4. Chapters in Order 372 from 25/04/2016
 - 9.2.5. Appendixes in Order 372 from 25/04/2016
- 9.3. ATEX
 - 9.3.1. Introduction
 - 9.3.2. ATEX Risk Assessment
 - 9.3.3. Zoning: Steps of Risk Assessments
 - 9.3.4. Equipment and protective systems
 - 9.3.5. CE and EX markings
 - 9.3.6. Maintenance and inspection
- 9.4. Power-to-X Standardization overview
- 9.5. Power-to-X related regulations



10. TECHNICAL SAFETY

- **10.1** Hydrogen at the core
- **10.2** Technical Safety and Essential Safety Requirements
- **10.3** Hydrogen Readiness
- **10.4** European Roadmap on Hydrogen Standardisation
- **10.5** Regulations and Directives for Technical Safety
- **10.6** Product Certification and Compliance
- **10.7** Compliance with Harmonised Standards
- **10.8** Compliance by Other Options
- **10.9** Technical Documentation
- 10.10 Technical Risk Analysis
- **10.11** The Effect of Hydrogen on Material Properties
- **10.12** Materials and Component Testing



11. GREEN FUELS DATA:

- **11.1.** Power-to green-Hydrogen
- **11.2**. Power-to-e-fuels
- 11.3. Power-to green AMMONIA
- **11.4**. Power-to green Methane
- **11.5.** Power-to green methanol
- 11.6. Power-to green jet-fuel
- 11.7. Carbon dioxide (CO2)

ROGE

FOR EACH FUEL

- Hazardous behaviour
- Identification
- Important properties
- Fire hazards
- Environmental hazards
- Human hazards
- Combability with others
- PPE
- First-aid measures
- Storage conditions

Thank You

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