



FUEL CELLS AND HYDROGEN
JOINT UNDERTAKING

Project DJEWELS1
Hazards Identification /
Risk Assessment
Approach
Workshop on Safety of Electrolysis

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DJEWELS:
Delfzijl Joint dEvelopment of a Water
Electrolyser at Large Scale

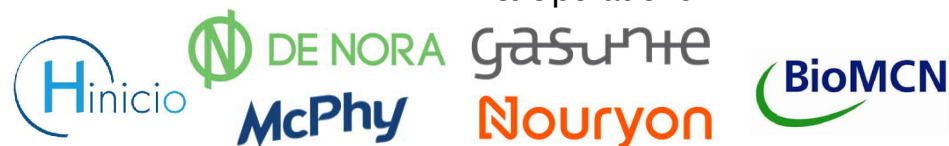


Consortium

Technology

Project dev.
& Operations

Customer





Overall project scope



Djewels 1:

- 20 megawatt waterelektrolyse-unit
- 3 kta green waterstof (33 mNm³/jr)
- Location: Chemie Park Delfzijl
- EU: FCH-JU Grant support
- Regional: Waddenfonds grant support

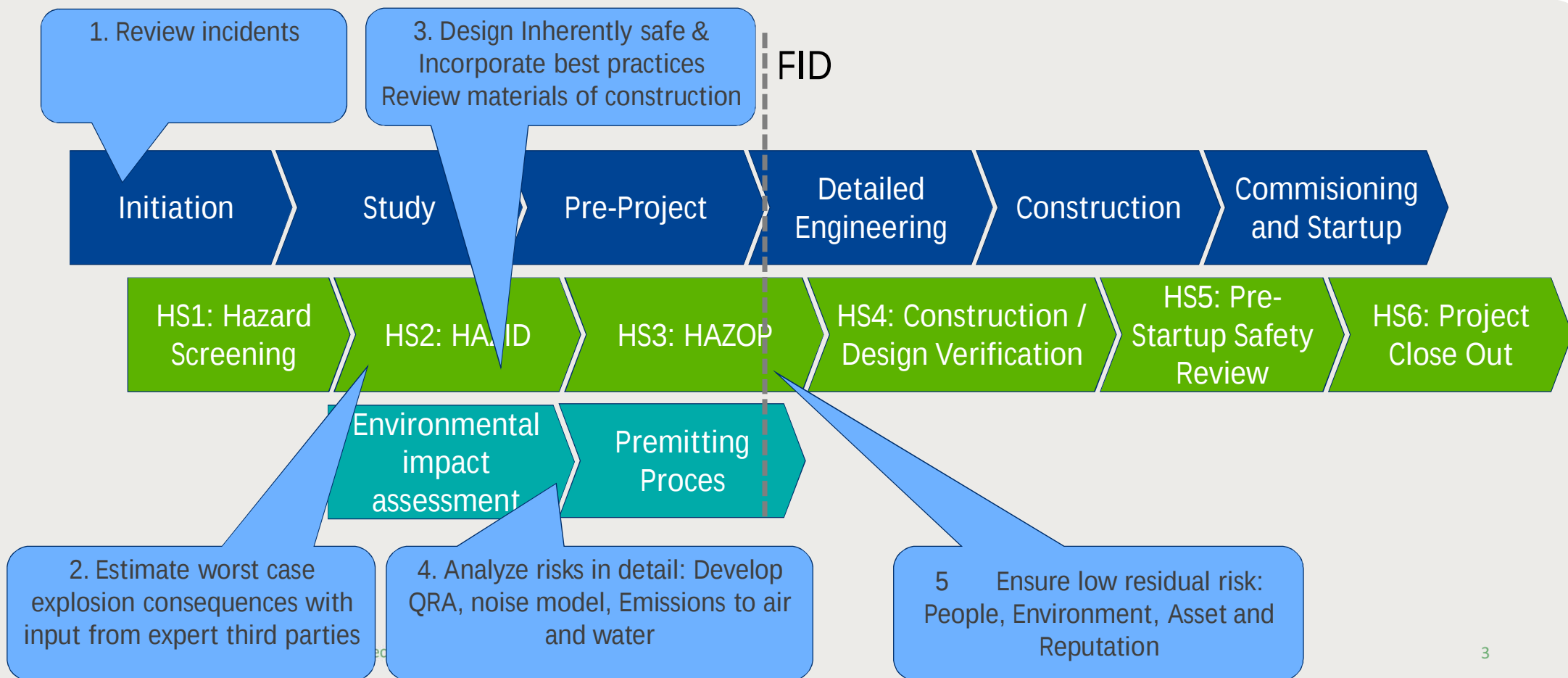


Technology:

- Pressurized alkaline water electrolysis by McPhy
- Electrode knowledge and design input from DeNora



Safety is an integral part of the Project Approach





Engineering standards to develop A working and safe design



- Directives
- Selection of European ISO / NEN norms
 - Process, Civil, Mechanical, Electrical, Safety, Piping, etc.
- Specifically on electrical and safety we also use Nouryon internal standards:
 - Electrical:
 - Ensuring electrical system is well designed and work
 - Safety:
 - Nouryon Process Safety Framework including HAZOP / HAZID methodologies
 - Safe operating requirements to isolate and open equipment





Risk Assessment, Prevention and Mitigations



Risk Assessment

- HAZID was done in a lot of detail → Recommendation is to assess safety in detail early in project
- Ultimate unmitigated consequences of failures is a detonation in equipment (Result observed found for all water electrolysis technologies assessed so far)
- Detonation effects were studied in detail → There is a clear gap knowledge to practically translate detonation effects into severity categories due to the shrapnell effects.

Mittigations

- Add layers of protection: Separate SIS and BPCS, Updated design control and safeguarding system → Residual risks were reduced to acceptably low values
- Due to innovative technology, first of a kind installation at large scale and the location it was decided specifically for this project to place the installation in a reinforced building that shields the environment from the unlikely event of an in equipment explosion



Operational concept, education, training



- Remotely operated
- Highly automated
- Training of operators to be developed

