

Later Is oVEr

New Clean Hydrogen, Nuclear Hydrogen



Status of Clean Hydrogen Production Demonstration

Aug 24, 2026

Taewon Kim
Senior Manager at KHNP



Contents

- I Introduction to KHNP
- II Nuclear-based Clean Hydrogen
- III Demonstration Research on Nuclear Hydrogen Production





I

Introduction to KHNP

Status of Clean Hydrogen Production Demonstration

Overview of KHNP

Carbon-free Clean **Energy Leader!**

Korea Hydro & Nuclear Power

Largest public power corporation that generates **32.04%** of South Korea's electricity

As of Dec. 2025

Nuclear | Hydro | Pumped Storage Hydro | Renewable | Hydrogen

Power Generation in Korea (Total 31,475.5 MW, excl. SPC) As of Dec. 2025

● Nuclear Power	26,050 MW	● Solar Power	88.7 MW
● Hydro Power	595.8 MW	● Wind Power	0.75 MW
● Small Hydro Power	11.7 MW	● Fuel Cell (KHNP)	28.6 MW
● PSH	4,700 MW	● Fuel Cell (SPC)	239.8 MW



No. of Employees
12,788



Assets
KRW 76.9 trillion
EUR 45.9 billion



Sales
KRW 15.5 trillion
EUR 9.2 billion



Credit Rating
Moody's : Aa2
S&P : AA

As of Dec. 2025



KHNP Overseas Business Status

Global Projects

Stepping up as a

Carbon-free Clean Energy Leader

Nuclear Power – 4 countries

- Czech Republic
- UAE
- Egypt
- Romania

Hydropower – 2 countries

- Pakistan
- Nepal

Wind Power – 1 country

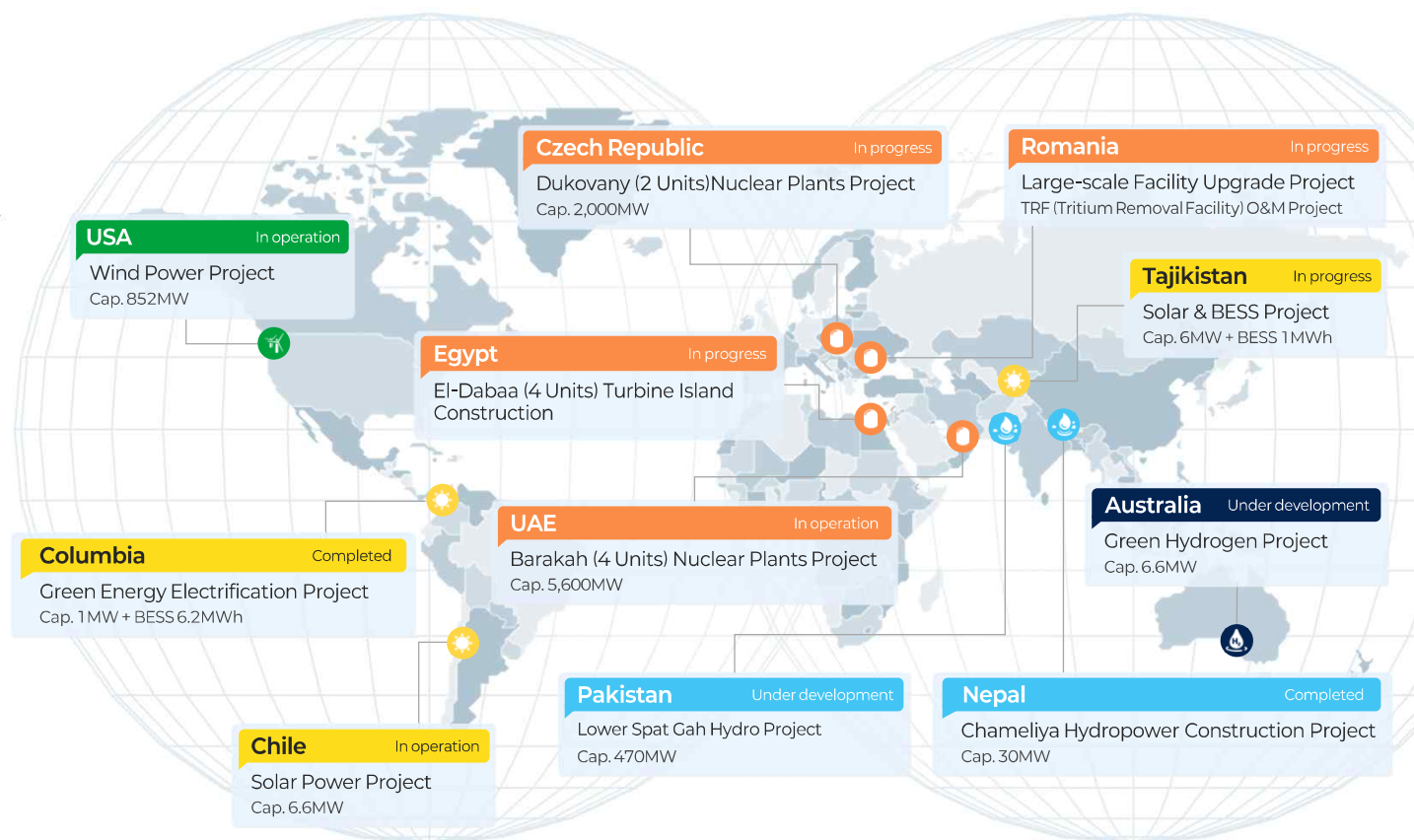
- U.S.A.

Solar Power – 3 countries

- Chile
- Columbia(ODA)
- Tajikistan(ODA)

Hydrogen – 1 country

- Australia





I

Nuclear-based Clean Hydrogen

Status of Clean Hydrogen Production Demonstration

Clean Hydrogen Certification in Korea (Republic of)

Clean Hydrogen Certification Guidelines

If greenhouse gas emissions during hydrogen production and import processes are below a certain level, it can be certified as Clean Hydrogen eligible for administrative and financial support

Criteria

Emission Scope

Well-to-Gate

Emission Criteria

$\leq 4\text{kgCO}_2\text{eq} / \text{kgH}_2$

Emission Calculation Boundary Diagram



(Unit : $\text{kgCO}_2\text{eq} / \text{kgH}_2$)

Grade of Clean Hydrogen

Grade 1

0 ~ 0.10

Green Hydrogen

Grade 2

~ 1.00

Nuclear Hydrogen

Grade 3

~ 2.00

Grade 4

~ 4.00

Blue Hydrogen

Motivation for Nuclear Hydrogen

IPCC AR5 Climate Change 2014

Low-carbon Energy	Power Source	Nuclear	Wind	Solar	Hydro
	g CO ₂ eq/kWh	12	11~12	27~48	24

IAEA / IRENA Renewable Power Generation Costs In 2021

High Capacity Factor	Power Source	Nuclear	Wind	Solar	Hydro
	Capacity Factor (%)	85	39	17	45

KPX Information System (Feb. 2026), Exchange Rate KRW 1,700/EUR

Low Electricity Cost	Power Source	Nuclear	Wind	Solar	Hydro
	Electricity Cost ₩/kWh (€/kWh)	79 (0.046)	110 (0.065)	119 (0.070)	129 (0.076)

Thermal Energy Use	Power Source	Nuclear	Wind	Solar	Hydro
	Thermal Energy	O	X	X	X

Roles of Nuclear-based Clean Hydrogen

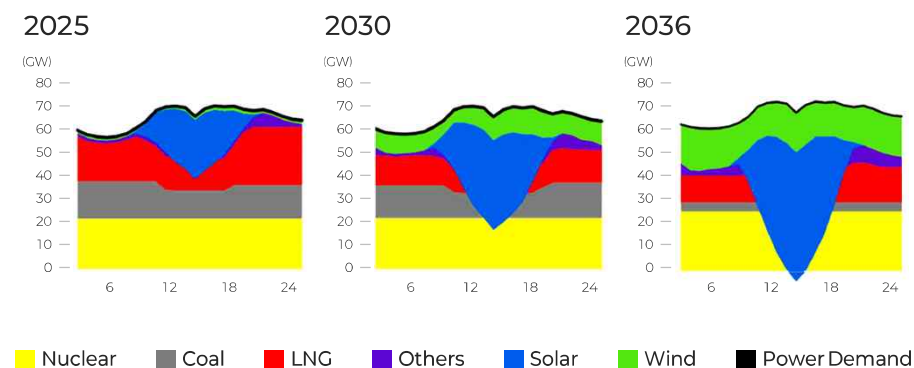
Changes in Power Grid

The 11th Basic Plan for Electricity Supply and Demand, Comparison of power generation shares by power source (%)

Year	Nuclear	Coal	LNG	Renewable Energy	New Energy	Clean H2 Ammonia	Other	Total
2018	30.7	31.4	26.8	8.4	1.2	-	1.4	100
2030	31.8	17.2	25.1	18.8	2.9	2.4	1.8	100
2038	35.2	10.1	10.6	29.2	3.8	6.2	5.0	100

Example of Daily Generation Pattern

Source 



Multiple use of operating NPPs(Nuclear Power Plants) with hydrogen plant

01 Demand response operation of the electrolyzer contributes to the stability of the power grid

02 Domestic clean hydrogen production contributes to carbon-free and energy security

Others: Pumped-storage hydroelectricity, Fuel Cell, IGGG, etc.

[Reference] Global Demonstration of Nuclear-based Clean Hydrogen





III

Demonstration Research on Nuclear Hydrogen Production

Status of Clean Hydrogen Production Demonstration

Demonstration R&D

Development of Nuclear-based Clean Hydrogen Technology by Phase South Korea National R&D Project

Phase 1

Foundational
Research

2022~ 2024

Project Foundational Research for Designing and Licensing a Large-scale Clean Hydrogen Production/Storage Plant to Secure Competitiveness

Phase 2

Demonstration

2024~ 2028

Project Demonstration of Low-temperature Electrolysis Hydrogen Production and Operation, integrated with Carbon-free Power in synergy with Renewable Energy Integration

Cost KRW 94.7 billion(EUR 56.9 million)

Areas of Research

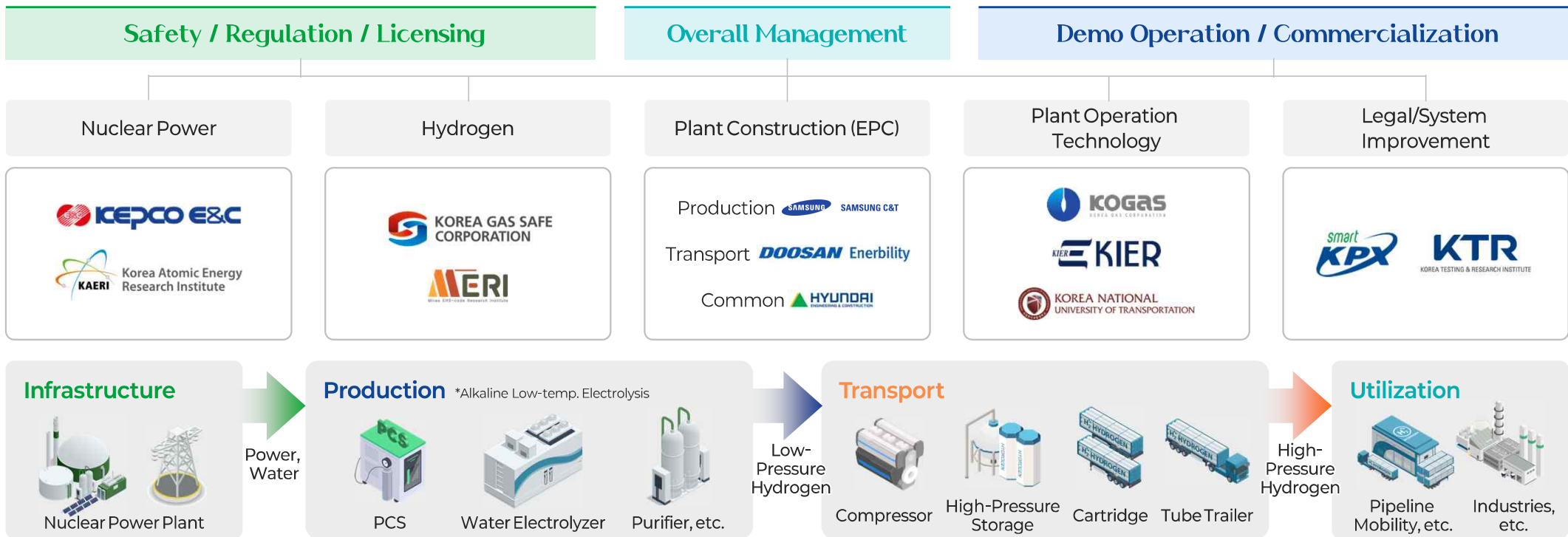
Design and construction of 10 MW low-temperature electrolysis clean hydrogen plants integrated with nuclear power, demonstration of clean hydrogen plant operation and establishment of a foundation for commercialization



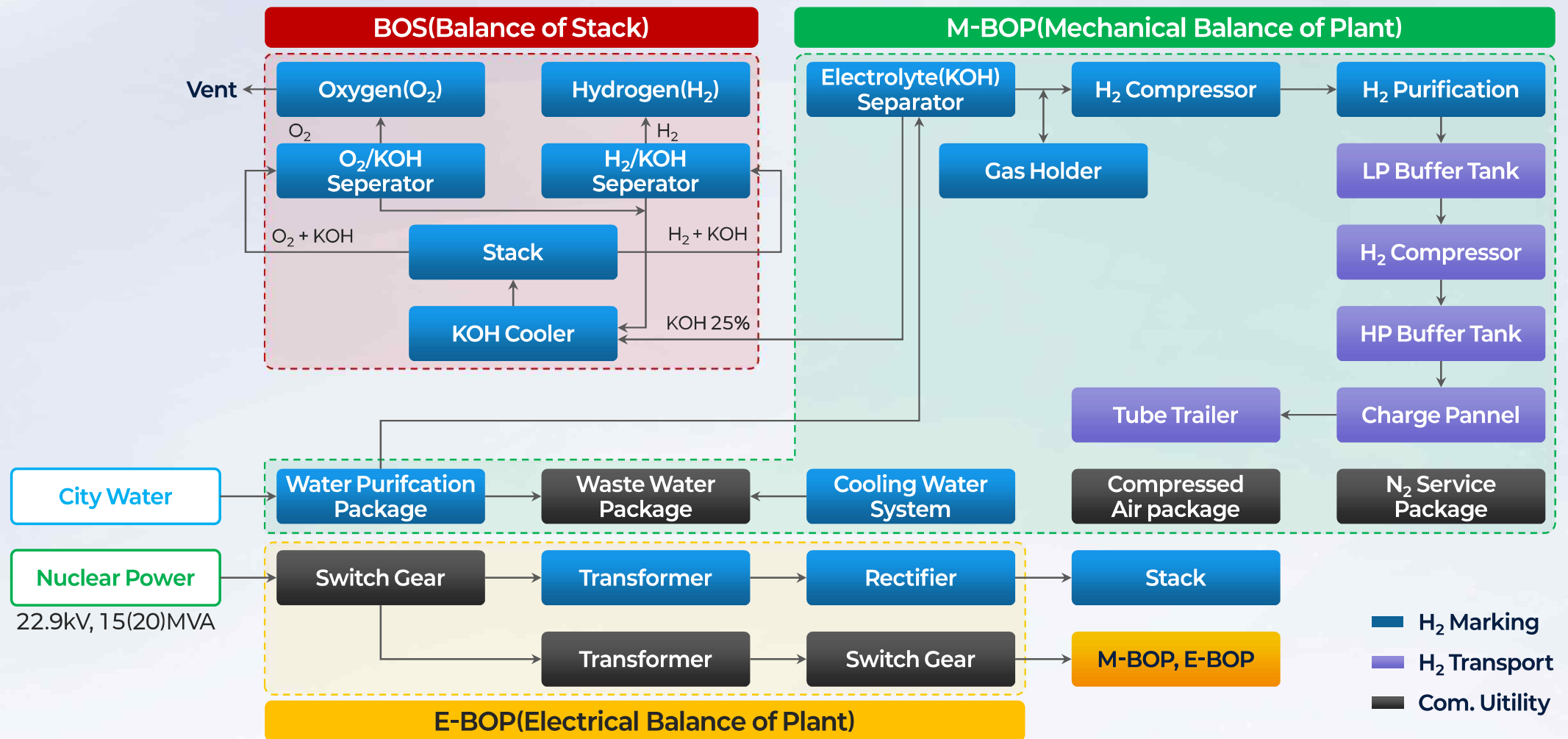
Demonstration Flow



- ◆ Integrated Management (Licensing, Hydrogen Plant EPC Project Management)
- ◆ Plant Demonstration Operation & Optimization Planning
- ◆ Foundation for Commercialization (Legal/System Improvement)

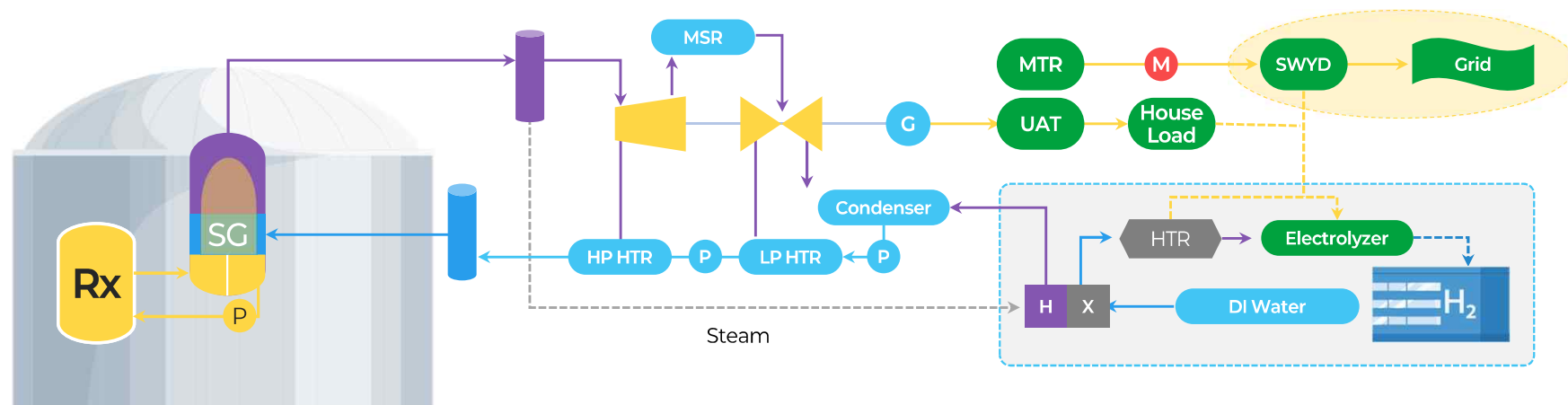


Basic Design – Hydrogen Production Plant

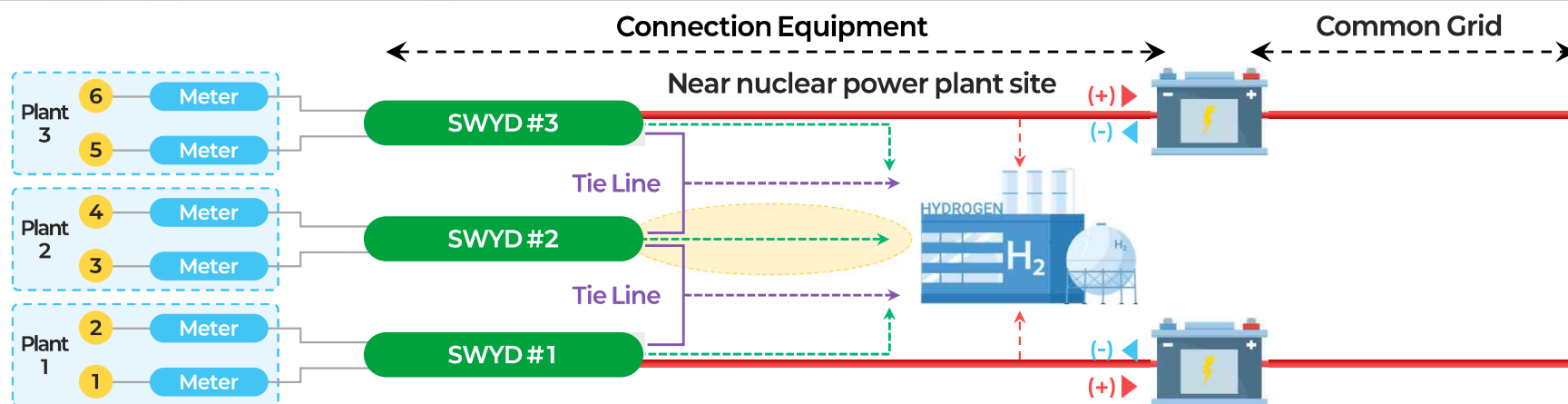


Technical Considerations - Integration of Operating Plants

Nuclear Power Plant Junction Review



Power Integration



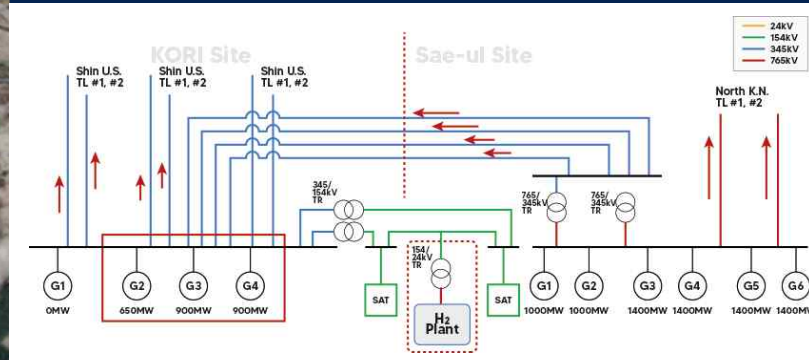
Connecting NPP Electricity to H₂ Production Plant

Saeul NPP

Kori NPP

Demo. Site

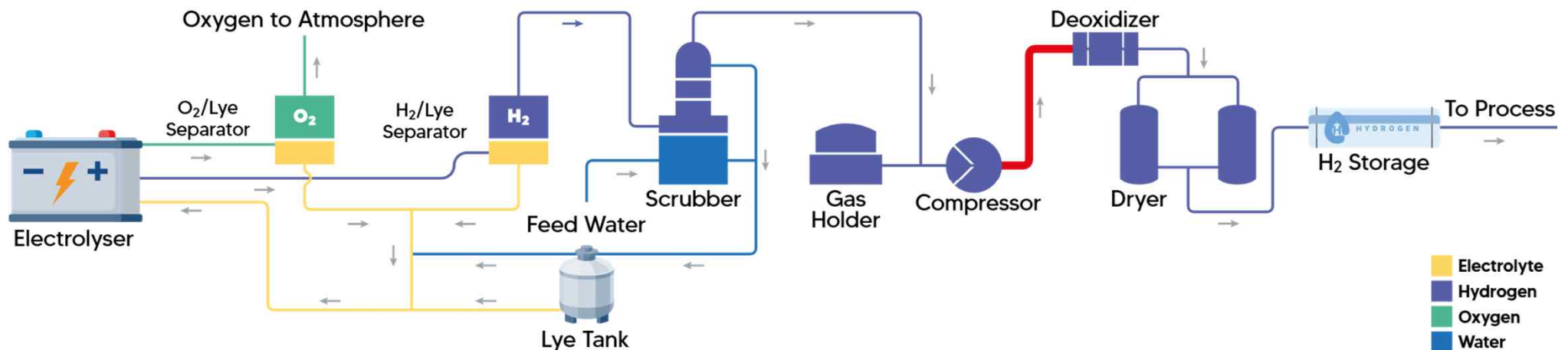
Simplified Single Line Diagram of Kori NPP Site & Saeul NPP Site



Kori-Saeul
Tie Line 154/24kV
Substation

Nuclear Permit - Hydrogen Hazard Analysis

H₂ Production facility Accident Scenario

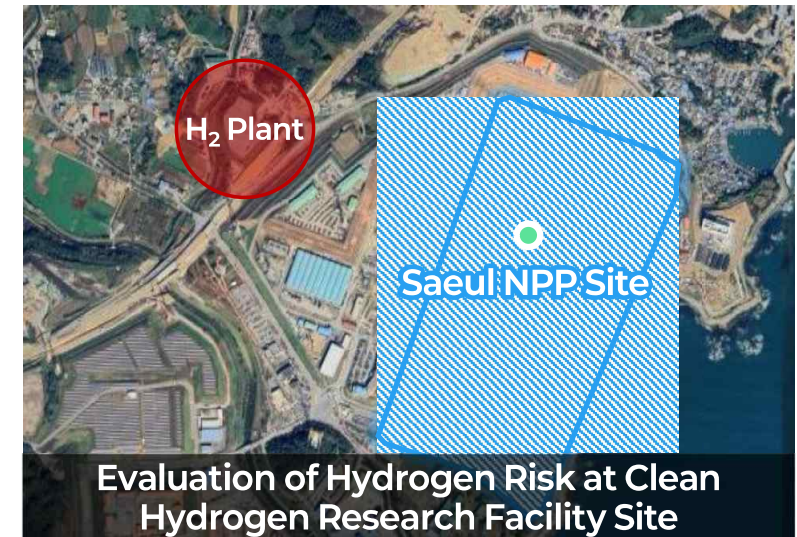
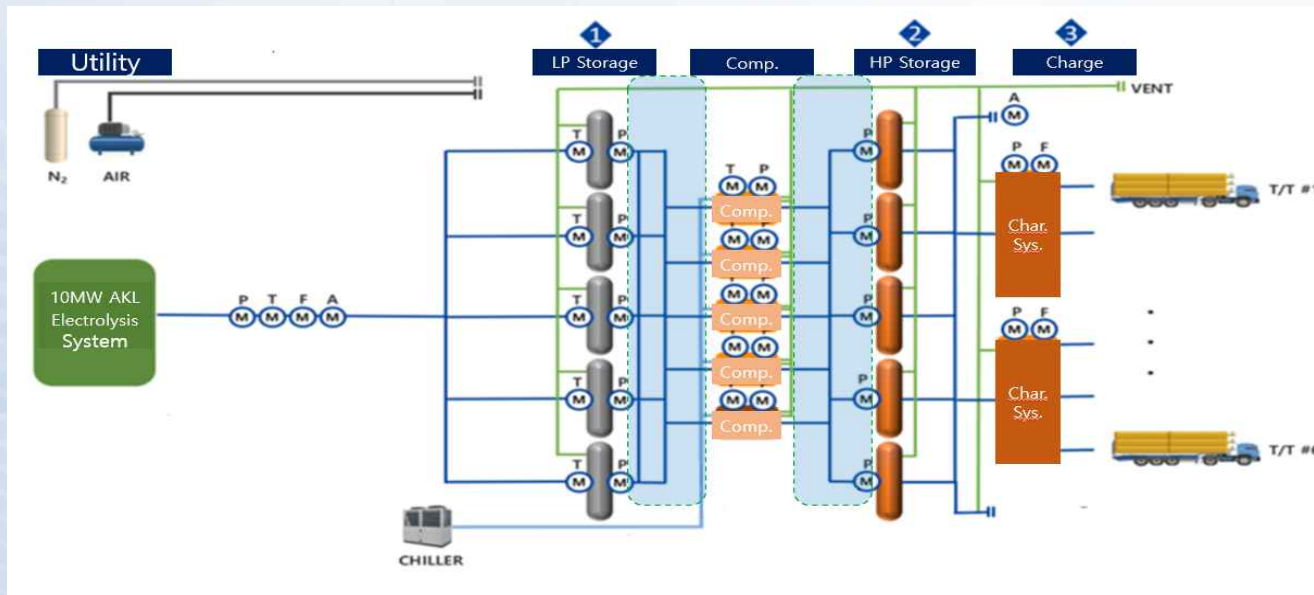


- Hydrogen Hazard increases in proportion to operating pressure or pipe diameter
- Worst Case is a complete rupture of the pipe between Compressor & Deoxidizer
- Lower explosive limit : 17.22%, Explosible H₂ mass : 0.69kg, TNT equivalent mass : 18.35kg
- **Safe separation distance : 48m**

➔ **H₂ Plant located more than 700m from NPP meets explosion overpressure regulations**

Nuclear Permit - Hydrogen Hazard Analysis

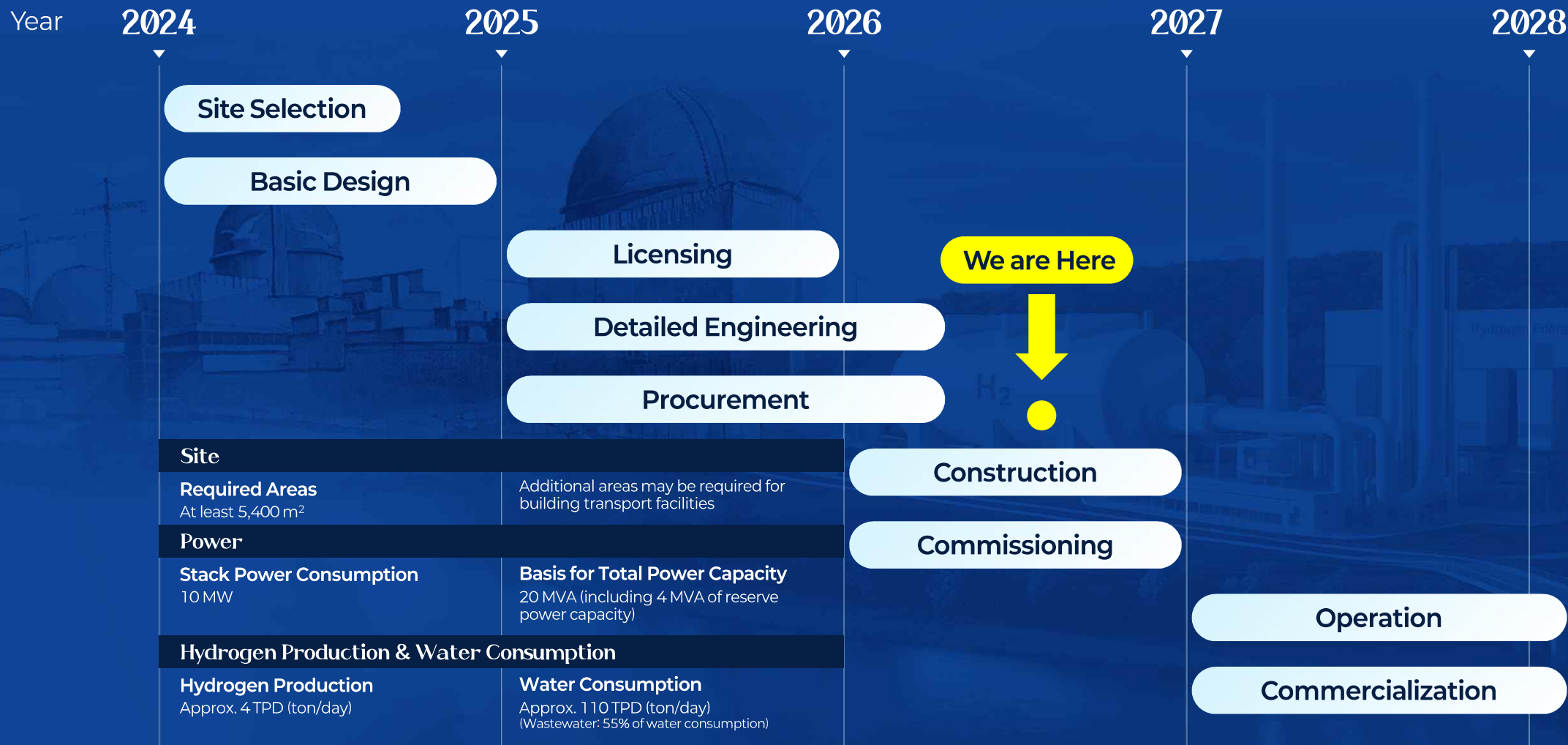
H₂ Transport facility Accident Scenario



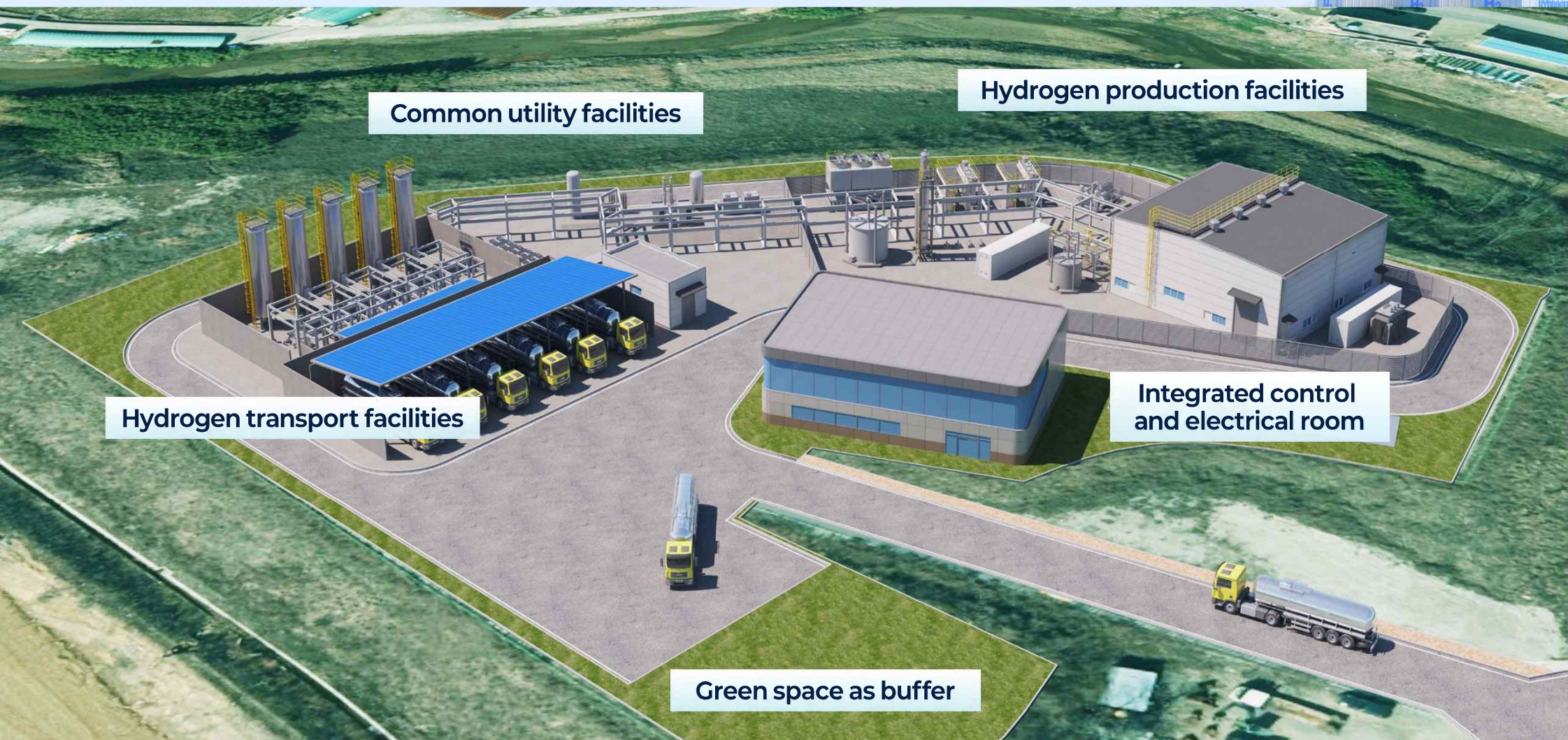
- Worst Case is a complete rupture of H₂ pipe at the rear of the high-pressure compressor.
- Lower explosive limit : 16.17%, Explosible H₂ mass : 6.3kg, TNT equivalent mass : 167.98kg
- **Safe separation distance : 27m**

➔ **H₂ Plant located more than 700m from NPP meets explosion overpressure regulations**

Project Schedule



Demonstration Site Aerial View



Demonstration Site Real View



Development of Clean Hydrogen Production Technology

Leader in Carbon-free Clean Energy

THANK YOU

