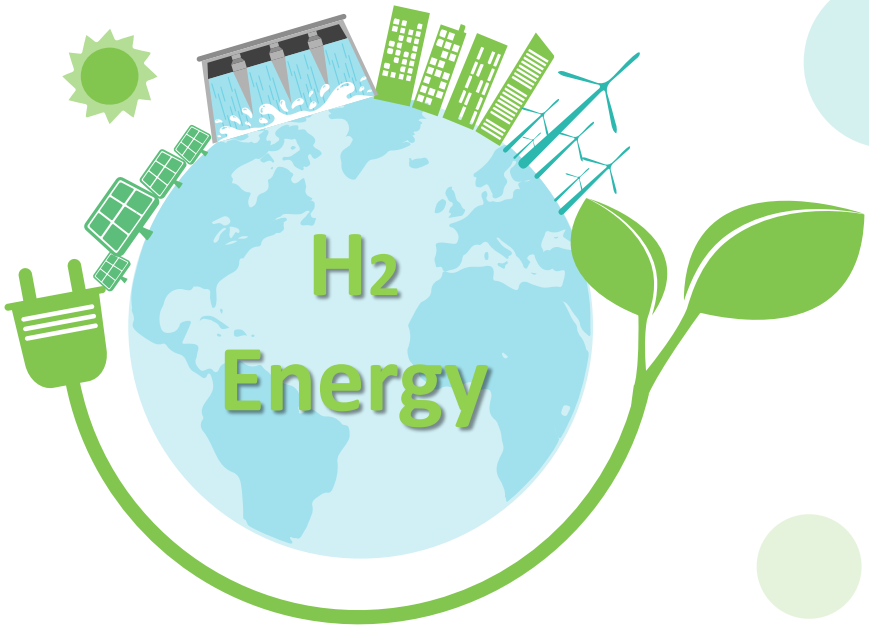


HSINTA GT33 H_2 Co-firing Demonstration Project

Hao Hsien Hsu
April 23 2024

Outline

I. Schedule of H_2 co-firing plan

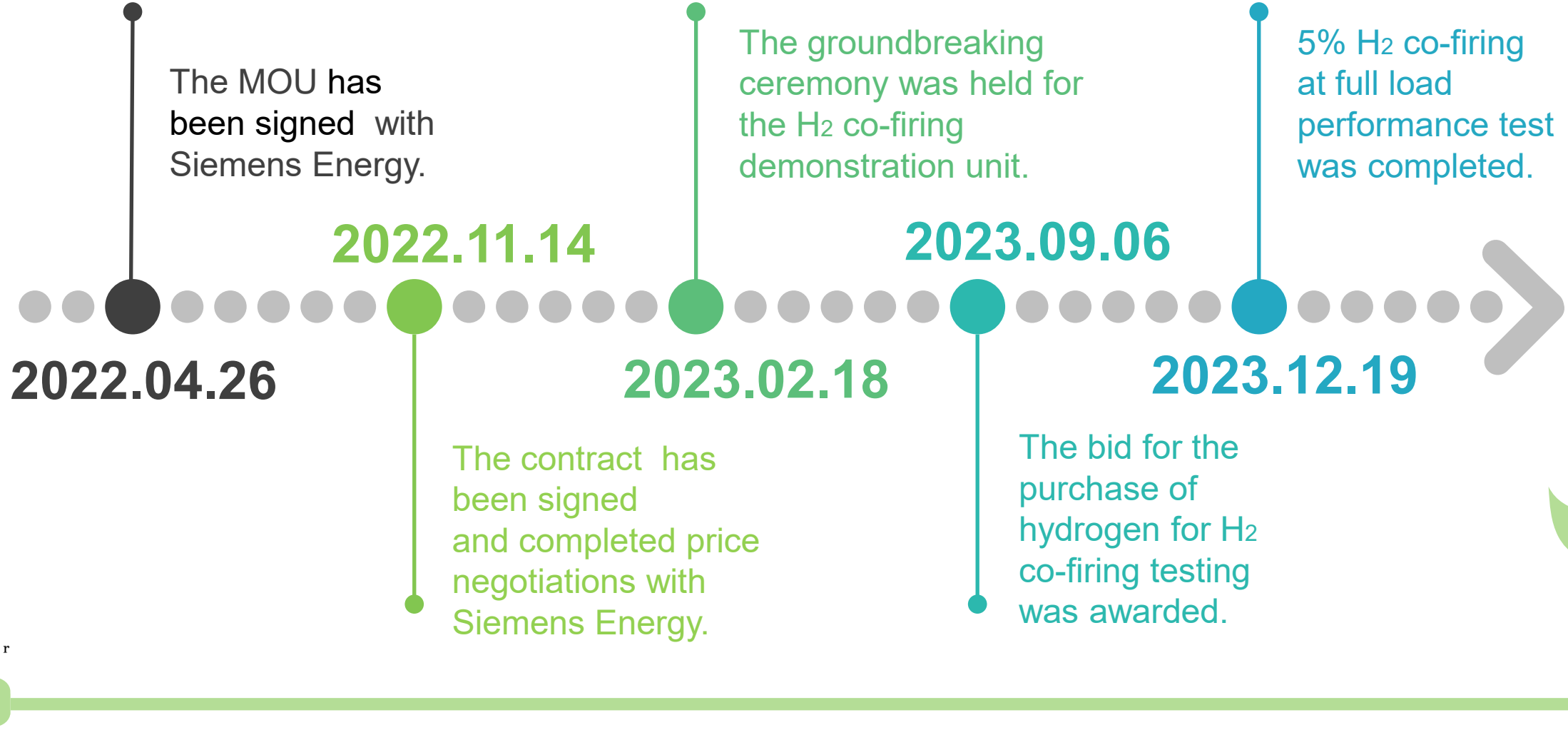
II. H_2 co-firing process & equipment architecture

III. H_2 co-firing benefit

IV. Difficulties for H_2 co-firing

V. Conclusions

I. Schedule of H_2 co-firing plan



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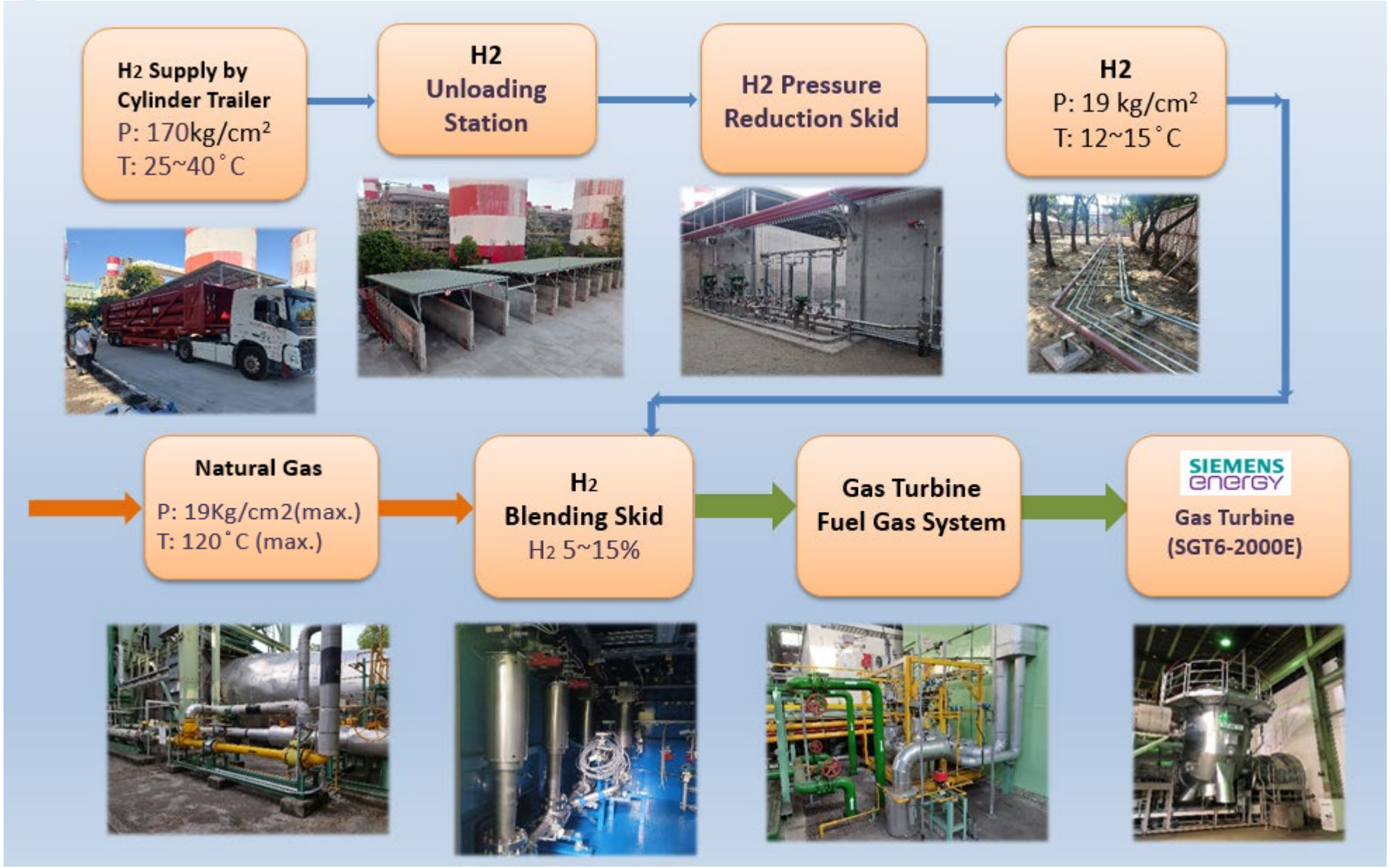
II. H_2 co-firing process & equipment architecture



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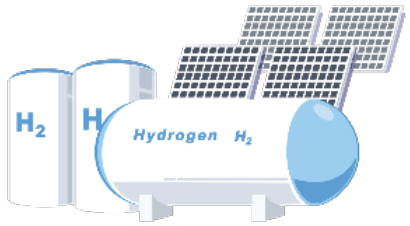
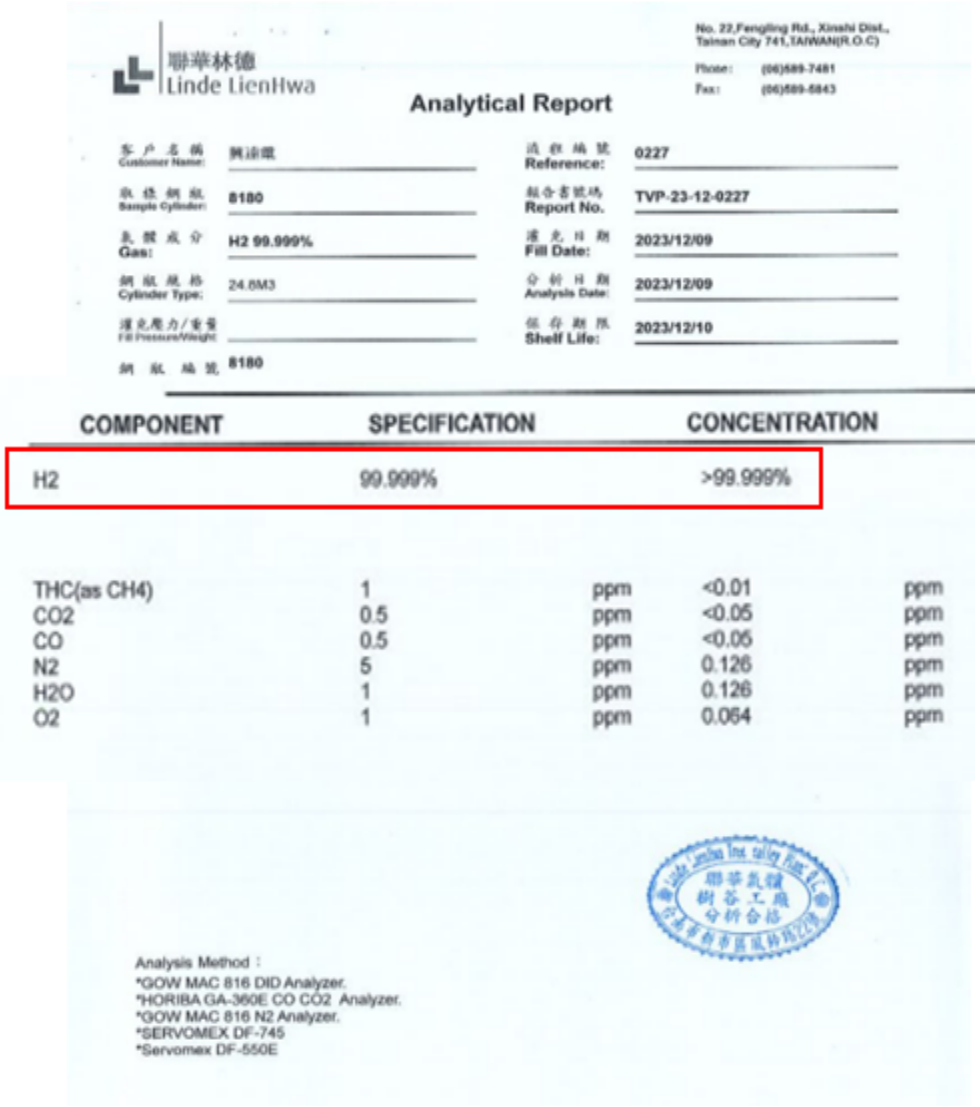
II. H_2 composition table



SE Requirement Specifications

ISO 14687 Type I Grade A

Gas constituents	Unit	Value
CH_4	Vol. %	To be reported
C_2H_6	Vol. %	To be reported
C_3H_8	Vol. %	To be reported
C_nH2_{n+2}	Vol. %	To be reported
C_nH_{2n}	Vol. %	To be reported
H_2	Vol. %	≧ 98
CO	Vol. %	To be reported
H_2O	Vol. %	cf. condensation point
N_2+Ar+CO_2	Vol. %	≦ 2
O_2	Vol. %	To be reported



聯華林德 Linde LienHwa

No. 22,Fengling Rd., Xinshi Dist., Tainan City 741,TAIWAN(R.O.C)
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Analytical Report

Customer Name:	興達廠	Reference:	0227
Sample Cylinder:	8180	Report No.	TVP-23-12-0227
Gas:	H2 99.999%	Fill Date:	2023/12/09
Cylinder Type:	24.6M3	Analysis Date:	2023/12/09
Fill Pressure/Weight		Shelf Life:	2023/12/10
	8180		

COMPONENT	SPECIFICATION		CONCENTRATION	
H2	99.999%		>99.999%	
THC(as CH4)	1	ppm	<0.01	ppm
CO2	0.5	ppm	<0.05	ppm
CO	0.5	ppm	<0.05	ppm
N2	5	ppm	0.126	ppm
H2O	1	ppm	0.126	ppm
O2	1	ppm	0.064	ppm

Analysis Method :
*GOW MAC 816 DID Analyzer.
*HORIBA GA-360E CO CO2 Analyzer.
*GOW MAC 816 N2 Analyzer.
*SERVOMEX DF-745
*Servomex DF-550E

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III. H_2 co-firing benefit

1. 5% H_2 co-firing can reduce carbon dioxide emissions by 1 ton per hour at full load.

2. Verification standards:
   (1) NO_x Emissions < 8ppm
   (2) 5% H_2 co-firing can not affect the power generation efficiency of the unit, and the unit can automatically switch between H_2 co-firing and non-H_2 co-firing.

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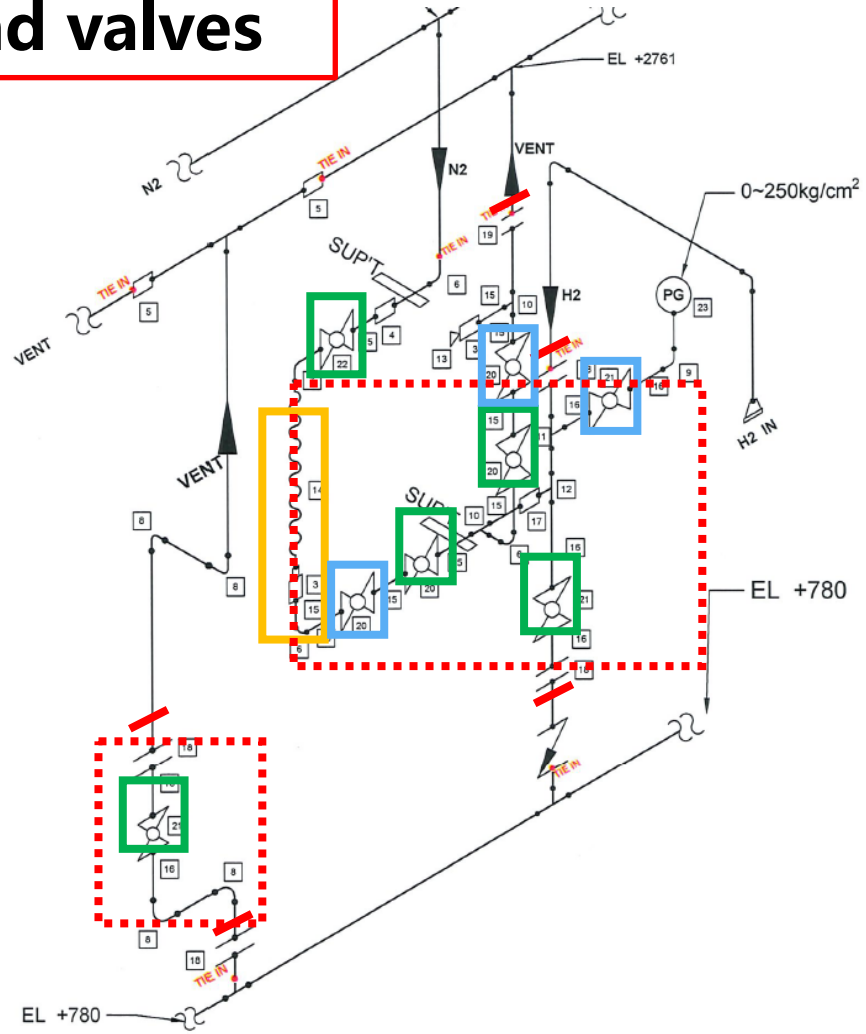
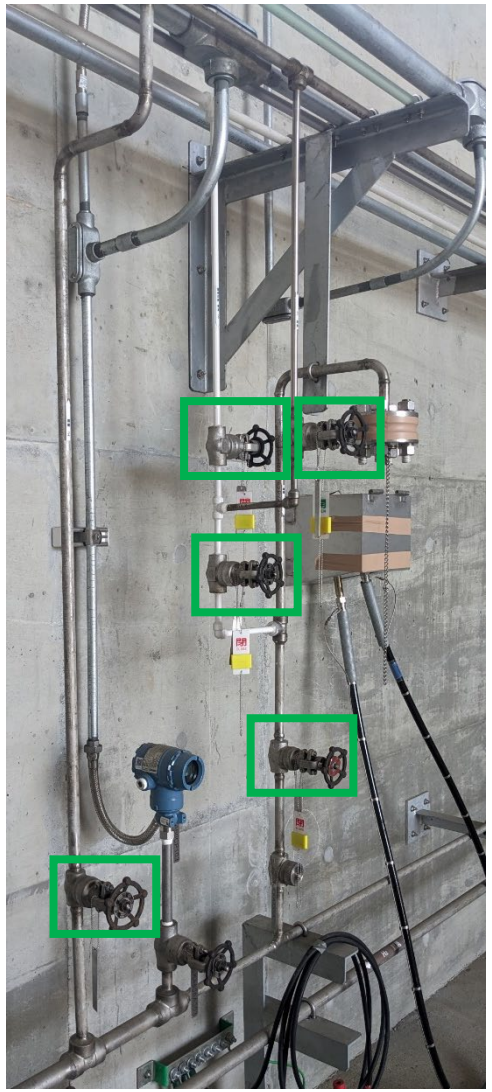
IV. Difficulties for H_2 co-firing

Improvement of hydrogen unloading station pipes and valves





renew ball valves

add ball valves

nitrogen hose and quick Connector

add flanges

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V. Conclusions

- To build the first domestic H_2 co-firing gas turbine generator. (The first SGT6-2000E for H_2 co-firing power generation in the world)
- To establish operation and maintenance mechanisms and safety standards for H_2 co-firing in large-scale Taipower units. (To provide a reference for other H_2 co-firing power generation units in domestic.)

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Thank You