

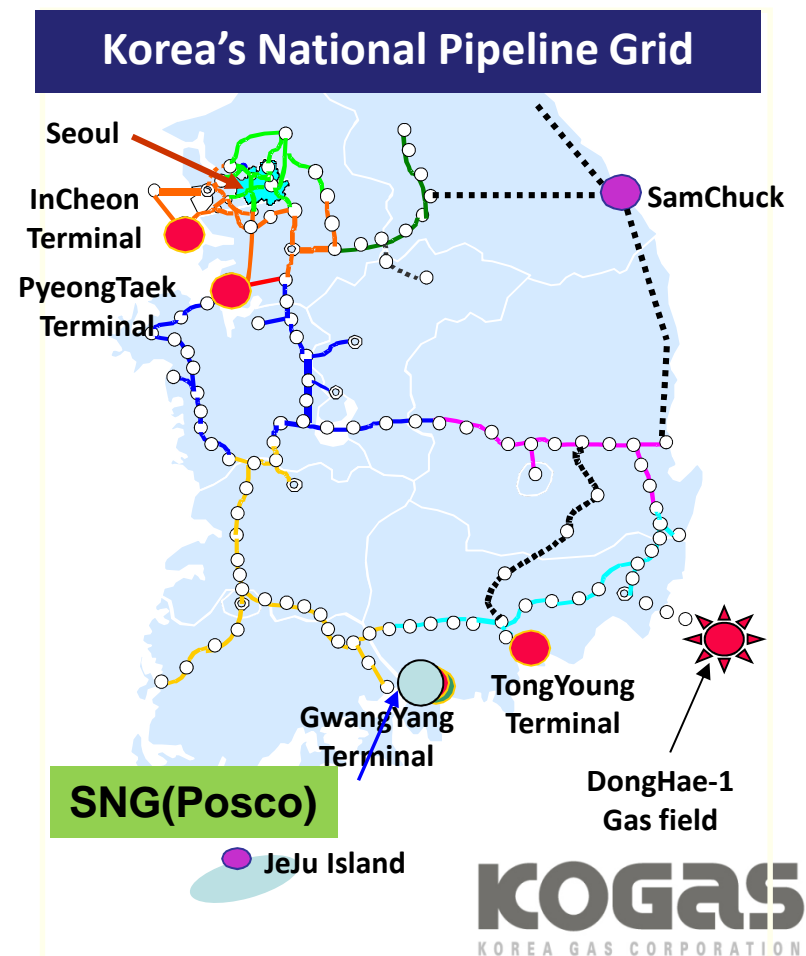
The effect of H₂ in SNG on existing pipeline integrity (Houston)

2013. 10. 2

Korea Gas Corporation

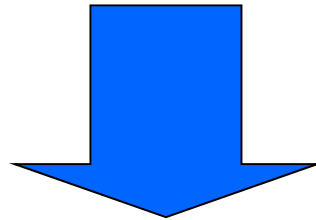
KOGAS Overview

- **Founded in 1983 (National Company)**
 - **World's largest LNG buyer**
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- **3 LNG terminals in operation (1 terminal under construction)**
 - 60 LNG storage tanks
 - **Integrated and looped pipeline grid**
 - Length of Trunk line : 3,558 km
 - Main pipeline(30") operation pressure : 7MPa
 - Pipeline material Grade : API 5L X65, X70
 - Easy to control and maintain, one of the best pipeline networks in the world
 - **256 Gas Distribution Stations**
 - Remote Control and Monitoring



Outline

- **Untill now, KOGAS NG pipeline has not been involved in H₂.**
- **POSCO(Steel Maker) will inject SNG into KOGAS pipeline.**
- **SNG(Synthetic Natural Gas) ,which converted by reforming process from coal, contains inevitable some impurity, specially H₂.**
- **Then, H₂ may induce Hydrogen Embrittlement in pipeline material.**

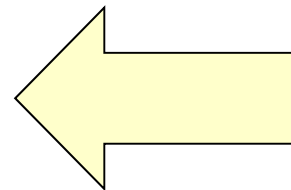
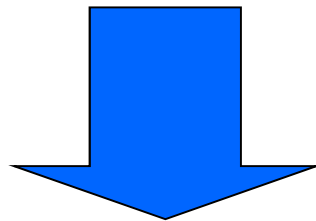


❖ So, KOGAS and POSCO are conducting the research project about the effect of H₂ on the NG pipeline in order to decide the maximum H₂content of SNG in the national gas quality code, Also the government will revise the gas business law.

Project Summary

❖ The effect of H₂ in SNG on pipeline integrity

- Small punch test and H₂ quantity analysis (KOGAS)
- Studying the effect of H₂ on pipeline operation (KOGAS)
- Computer simulation of H₂ behavior in pipeline material (Korea Univ.)
- The change of mechanical properties of pipe material in H₂ mixed gas (KRISS)
- Fatigue characteristics under H₂ mixed gas (POSCO)



- 2011.9. ~ 2013.12.
- 2M US\$
- Project Steering Committee
- Technical Consulting Committee

- ❖ Maximum hydrogen quantity to inject in existing high pressure pipeline
 - How much % of H₂ in SNG is acceptable ?

Experiment

Atm condition(RT)
- Natural gas w/o H₂

Base & weld metal

-SP(small punch)

-Tensile, Notch Tensile

-CTOD

-Fatigue crack growth



Reference Properties

Tested in 10 MPa 1% H₂
Mixed gas

Base & weld metal

-SP

-Tensile, Notch Tensile

-CTOD

-Fatigue crack growth



H₂ gas Effect

Tested in 10 MPa 1% H₂
Mixed gas after 30 days
exposure

Base & weld metal

-SP

-Tensile, Notch tensile

-CTOD

-Fatigue crack growth



Life Assessment

