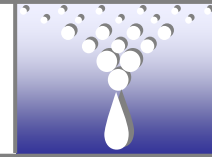




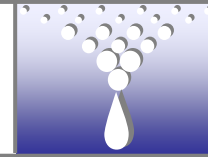
Nippon GTL
Technology Research Association

GTL Demonstration Test Project



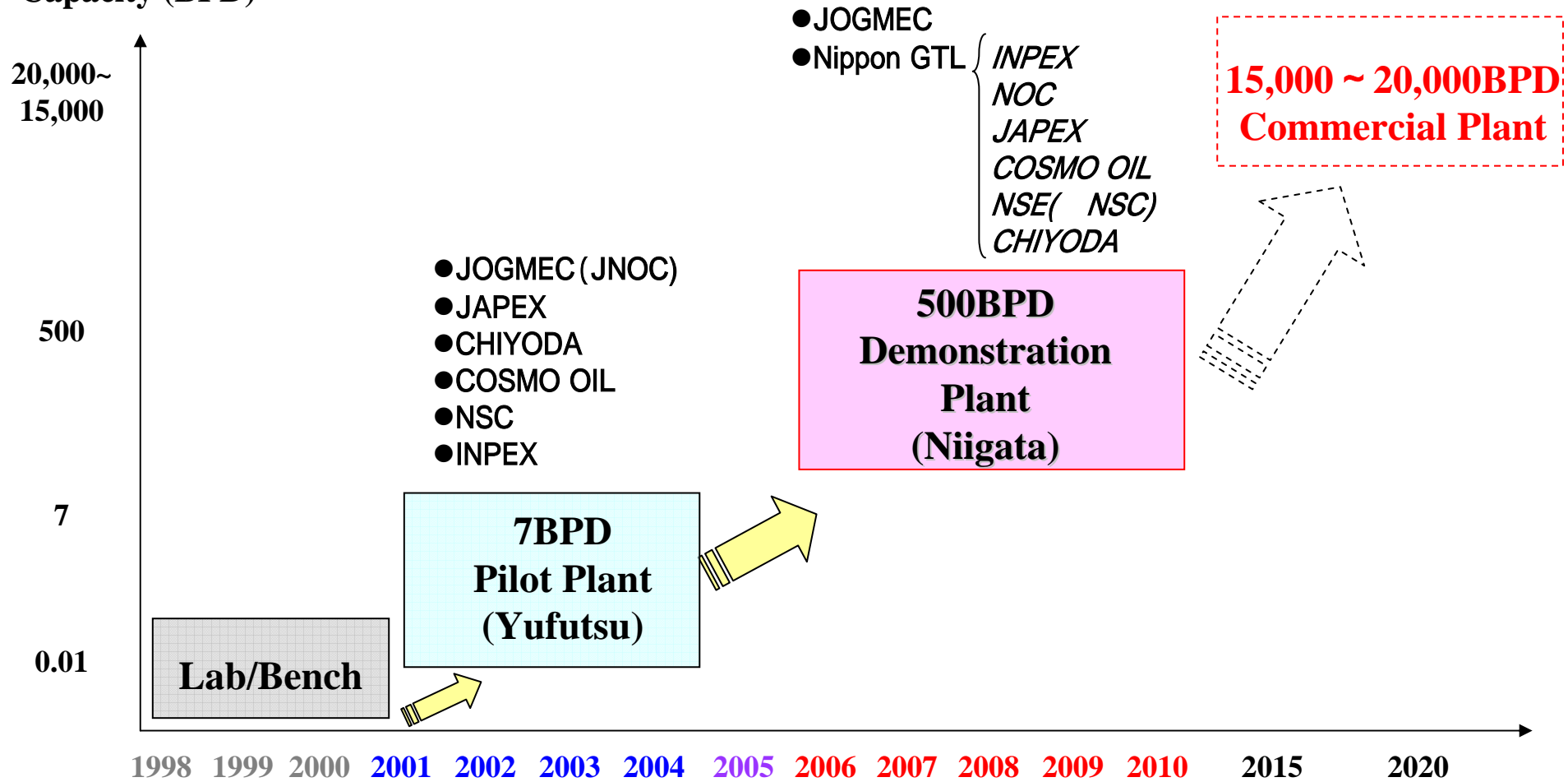
- (1) Introduction – Development of JAPAN-GTL Process**
- (2) Nippon GTL Technology Research Association**
- (3) GTL Demonstration Test Project**
 - Objectives (Goal)
 - Characteristic of JAPAN-GTL Process
 - Strengthening of Competitive Edge
 - Scale-up Method
 - Schedule
 - 500 BPD GTL Demonstration Plant
- (4) Conclusion**

(1) Introduction: JAPAN-GTL Process

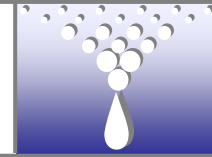


2

Capacity (BPD)



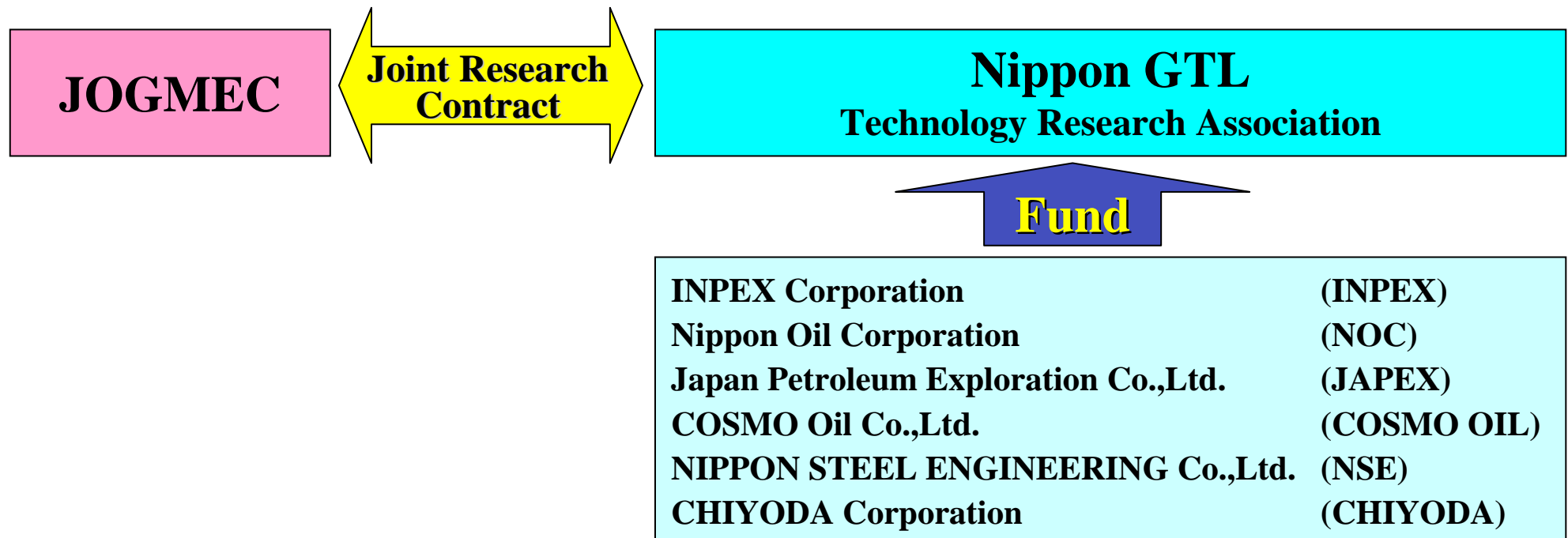
(2)Nippon GTL Technology Research Association



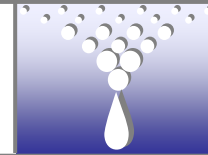
3

Establishment: Jointly established by the following **six Japanese private companies** on **October 25th 2006**

Purpose: In order to conduct GTL Demonstration Test Project with JOGMEC to develop commercial GTL Technology



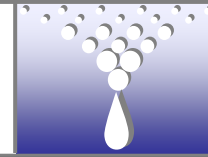
(3) GTL Demonstration Test Project Objectives (Goal)



4

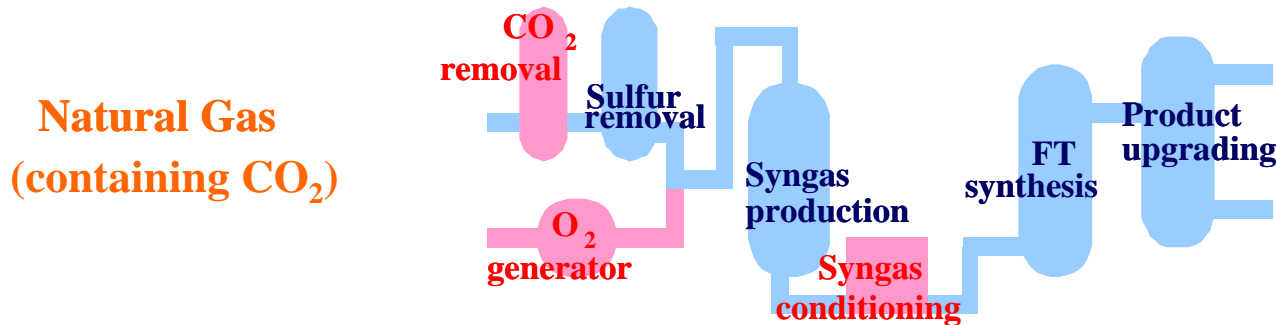
- **Our Final Goal is:**
To develop JAPAN-GTL Process as a commercial technology.
- **Acquiring know-how for plant engineering and plant operation.**
- **Carrying out further R&D activity.**
 - **To improve process and catalyst performance**
 - **To accumulate scale-up know-how**
(e.g. developing reactor simulator)

Characteristics of JAPAN-GTL Process(1)



5

Conventional Process



Syngas Production

- Non-catalytic Partial(OX) Oxidation
- Auto thermal Reforming(ATR)

FT Synthesis

- Co or Fe Based Catalyst

JAPAN-GTL Process



Syngas Production

- Steam/CO₂ Reforming

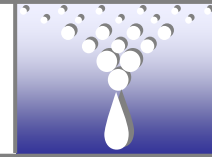
FT Synthesis

- Co Based Metal Catalyst

No Need for
O₂ Generator
CO₂ Removal Unit
Syngas Conditioning

Steam/CO₂ Reforming (CO₂ as Feed Gas)

Simplified Process (Potential of Cost Reduction)



GTL Demonstration Plant

Yufutsu GTL Pilot Plant

Natural Gas
(**Methane**
CO₂)

**Syngas
Production**

**FT
Synthesis**

Upgrade
(**Hydro Cracking**)

Naphtha
Kerosene
Diesel

Catalyst

Noble Metal Catalyst

Reactors

Tubular Reformer
(**Steam/CO₂ Reforming**)

(**Original Technology :Chiyoda**)

Co Based Metal Catalyst

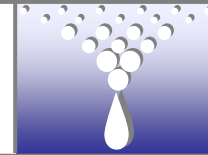
**Slurry Bubble
Column Reactor**

(**Original Technology :NSE**)

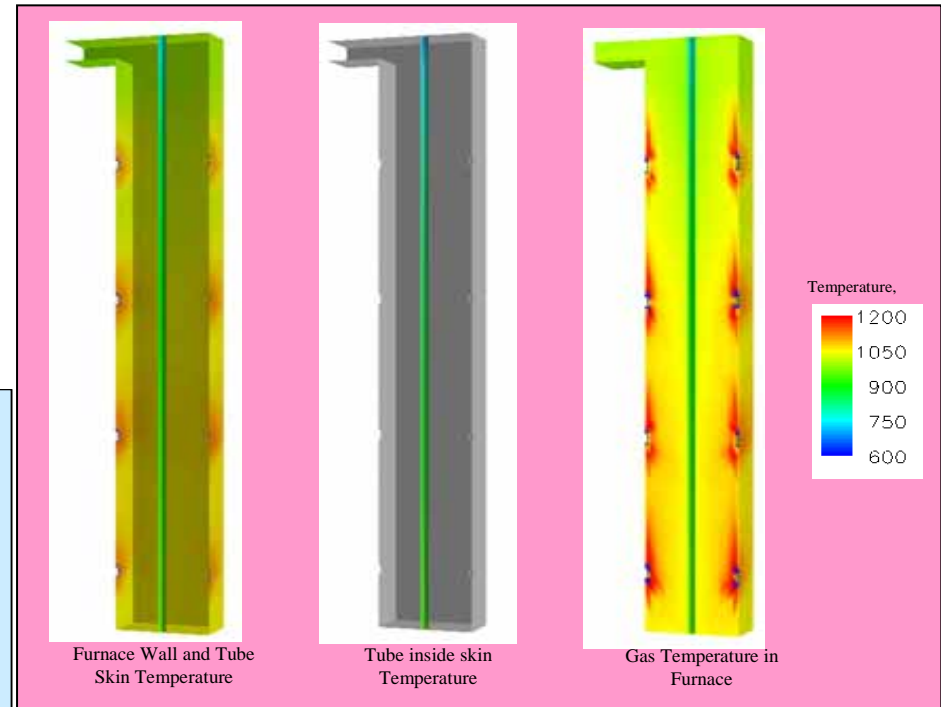
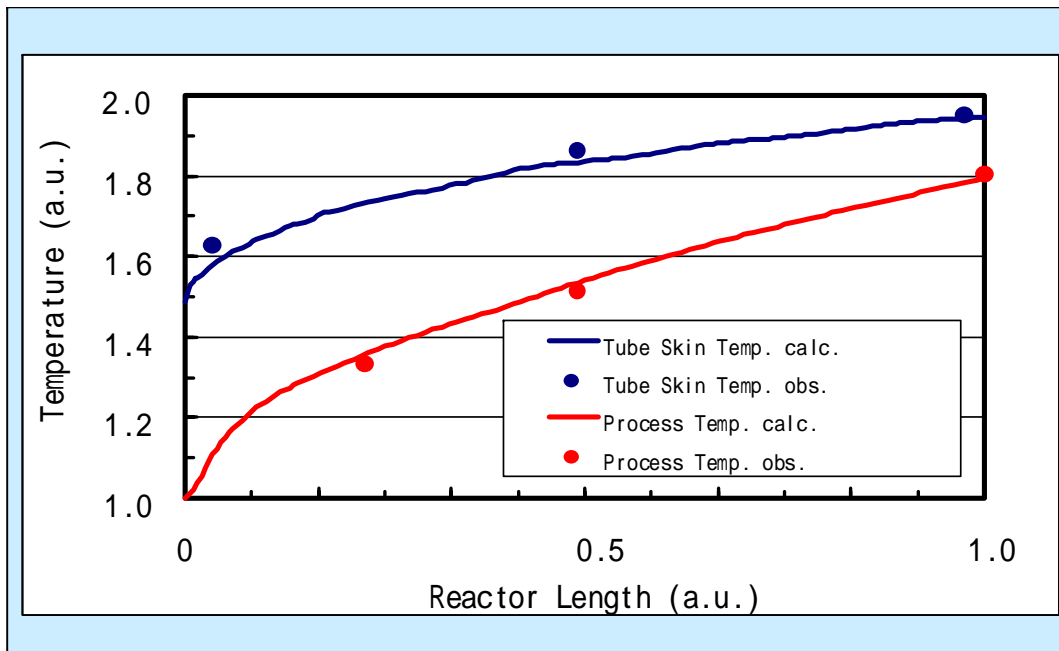
Noble Metal Catalyst

Fixed Bed Reactor

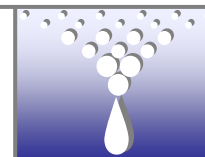
(**Original Technology :NOC**)



Improve Reformer Efficiency



Computational Fluid Dynamics



Improve Productivity by Catalyst , Control FT Reaction and Fluid Dynamics

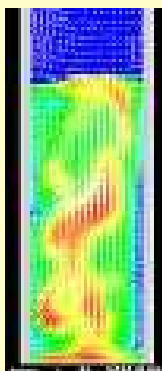
Verification of CFD model



Lab

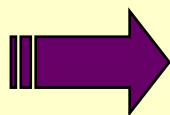
600mmD × 3,000mmH

(catalyst, cooling tube, no reaction)

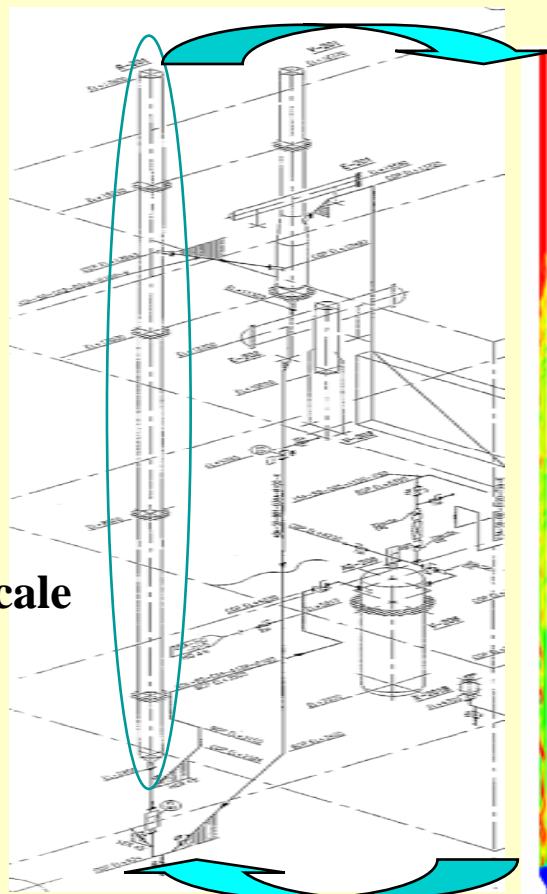


CFD

Scale Up



To Pilot Scale
(7BPD)



250mmD × 15,000mmH

Engineering Tool
(Macro Process Model)

Design

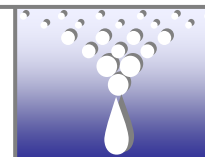
Scale Up

Verification

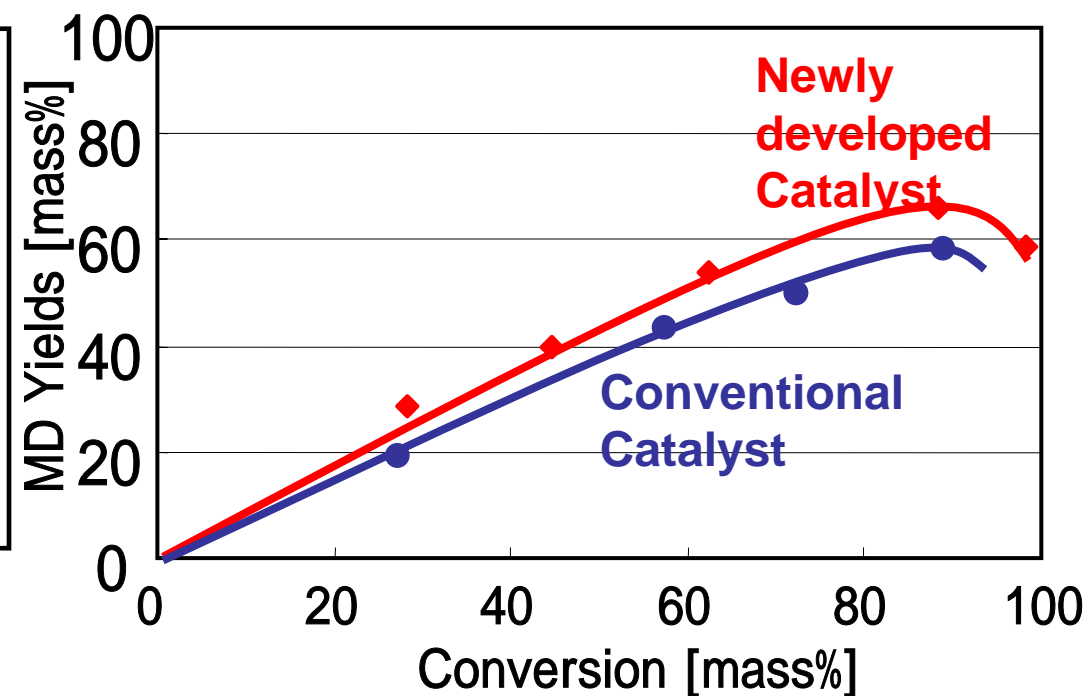
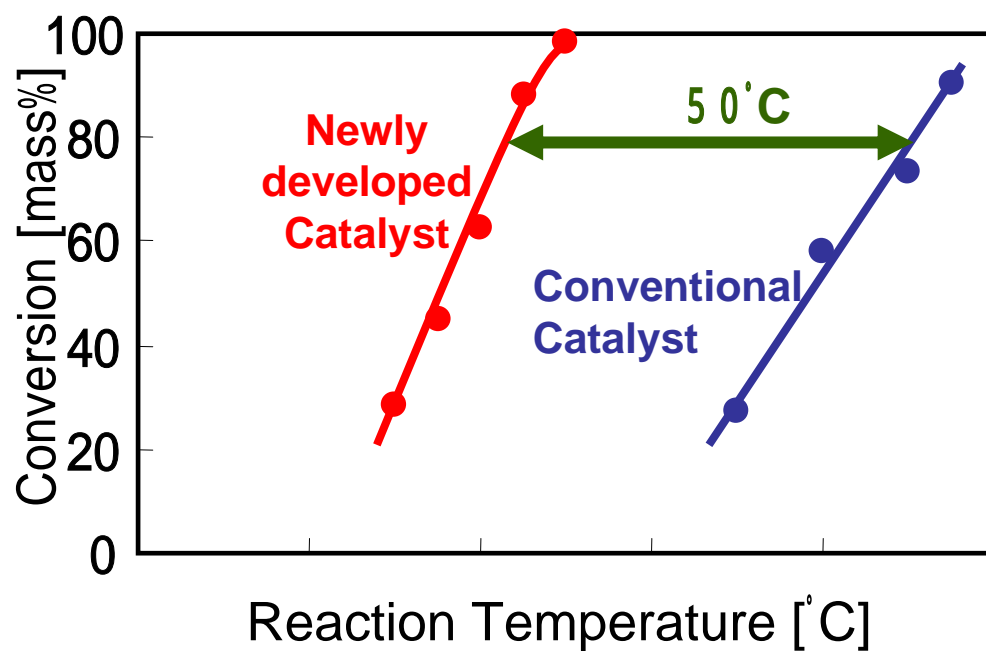
Demo Plant (500BPD)

Scale-up Method

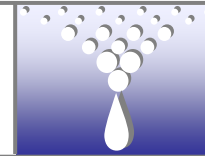
Commercial Plant



Newly-developed upgrading catalyst has higher performance both in activity and MD selectivity.



Schedule of GTL Demonstration Test Project

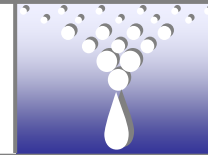


10

Duration: 5 years

	FY2006 April	FY2007 April	FY2008 April	FY2009 April	FY2010 April
Demonstration Plant					
EPC	[Yellow bar]				
Pre-Commissioning				[Orange bar]	
Start-up				[Orange bar]	
Demonstration Test				[Red bar]	[Red bar]
Back-up R&D					
Improvement of Catalysts	[Green bar]				
Process Optimization	[Green bar]				
Scale-up Study				[Green bar]	

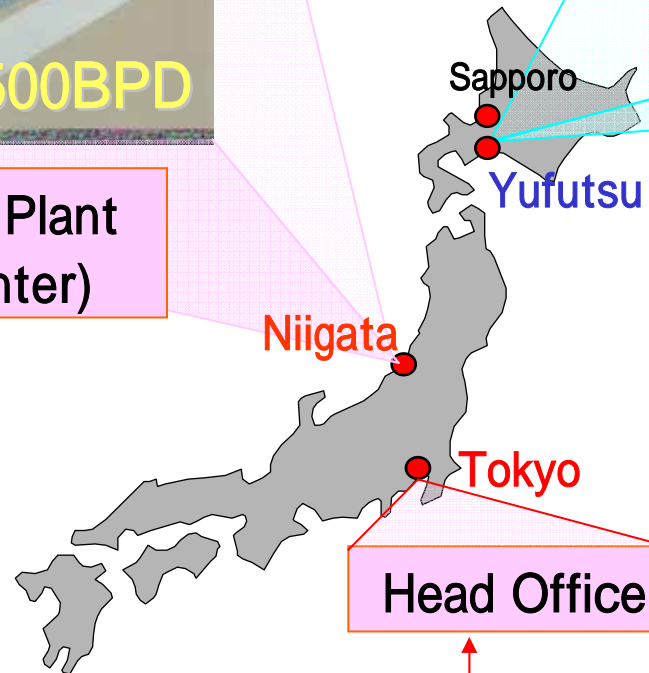
Plant Location



11



JAPAN



Yufutsu GTL Pilot Plant

GTL Demonstration Plant
(Niigata Testing Center)

Production Scale: 7BPSD

Production Start: August 2002

Plant Scale:

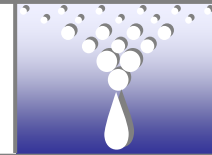
Syngas Reactor 110 ID × 14,000mm H

FT Reactor 250 ID × 15,000mm H

Nippon GTL Technology Research Association

right is vested Nippon GTL and JOGMEC

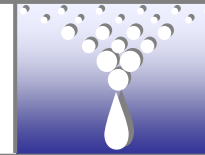
500 BPD GTL Demonstration Plant



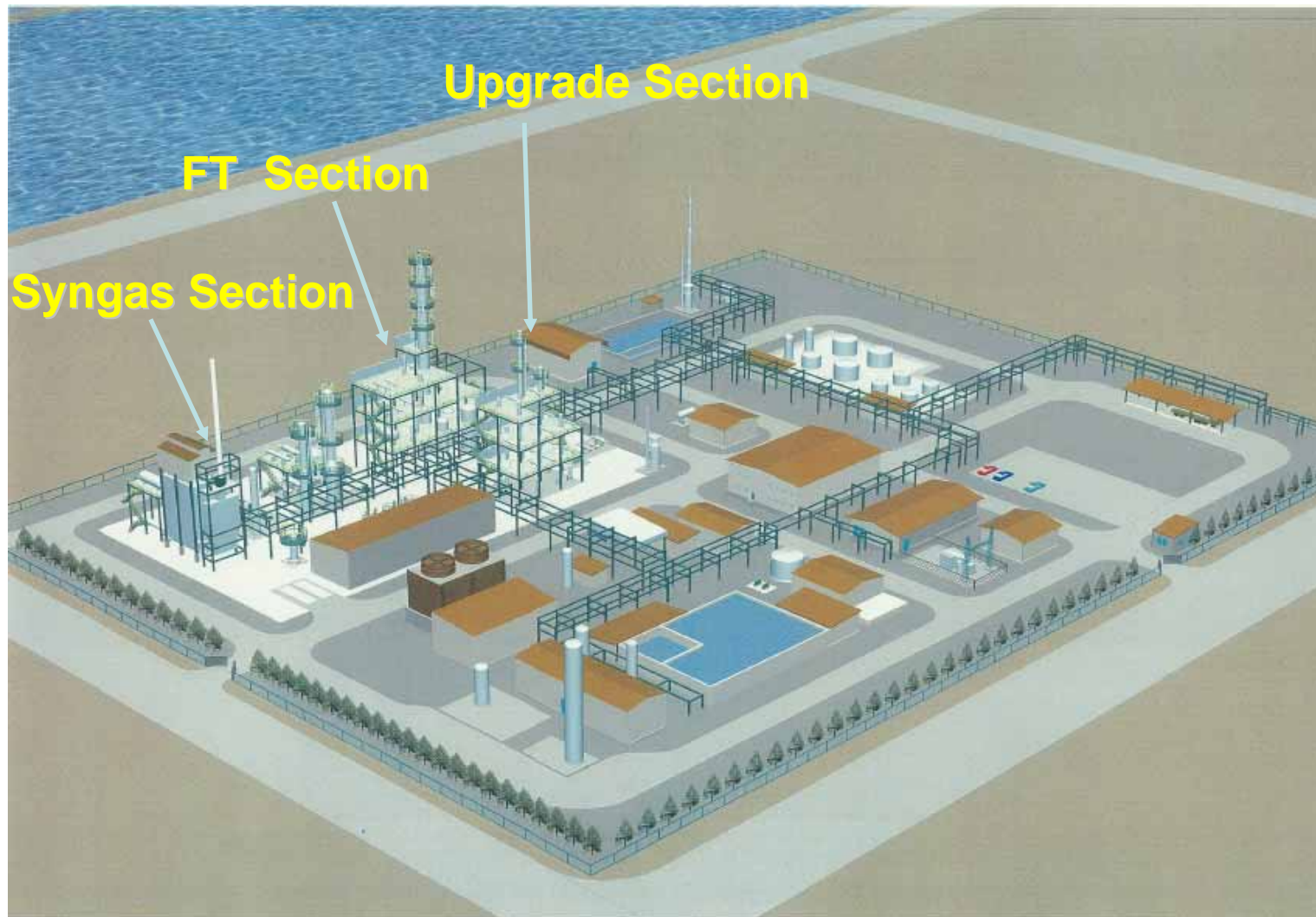
12

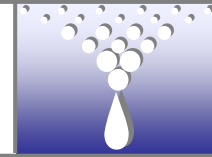


500 BPD GTL Demonstration Plant Layout



13





Japan-GTL process is unique and competitive.

Japan-GTL process is now in Demonstration Stage.

Demonstration project plan is well prepared for realization of commercial project.