

UNLEASHED AGRU PERFORMANCE USING MODELING TECHNIQUE AND IOW OPTIMIZATION



PRESENTED BY
PTT PUBLIC COMPANY LIMITED

TNChE ASIA 2023

3RD ENERGY COP
CONFERENCE



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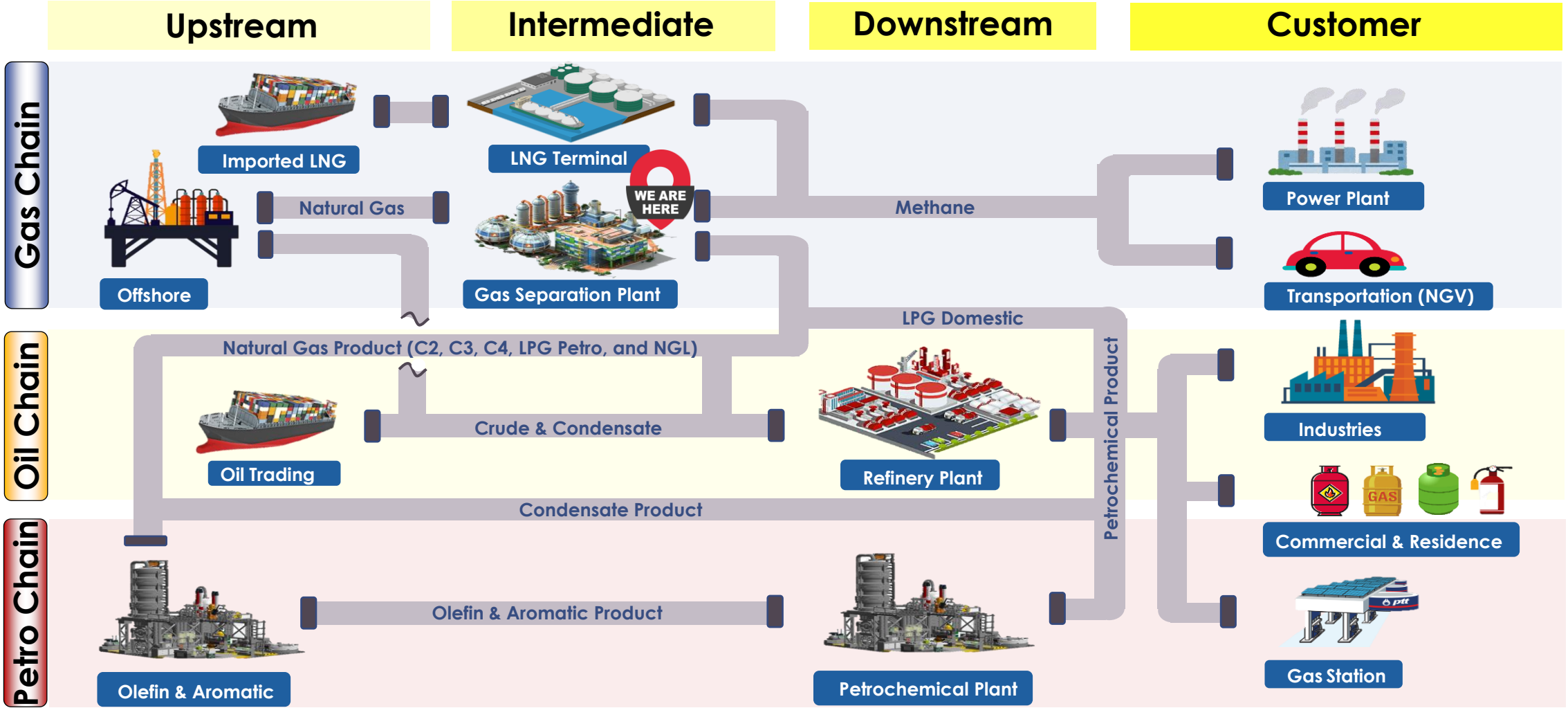
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Content

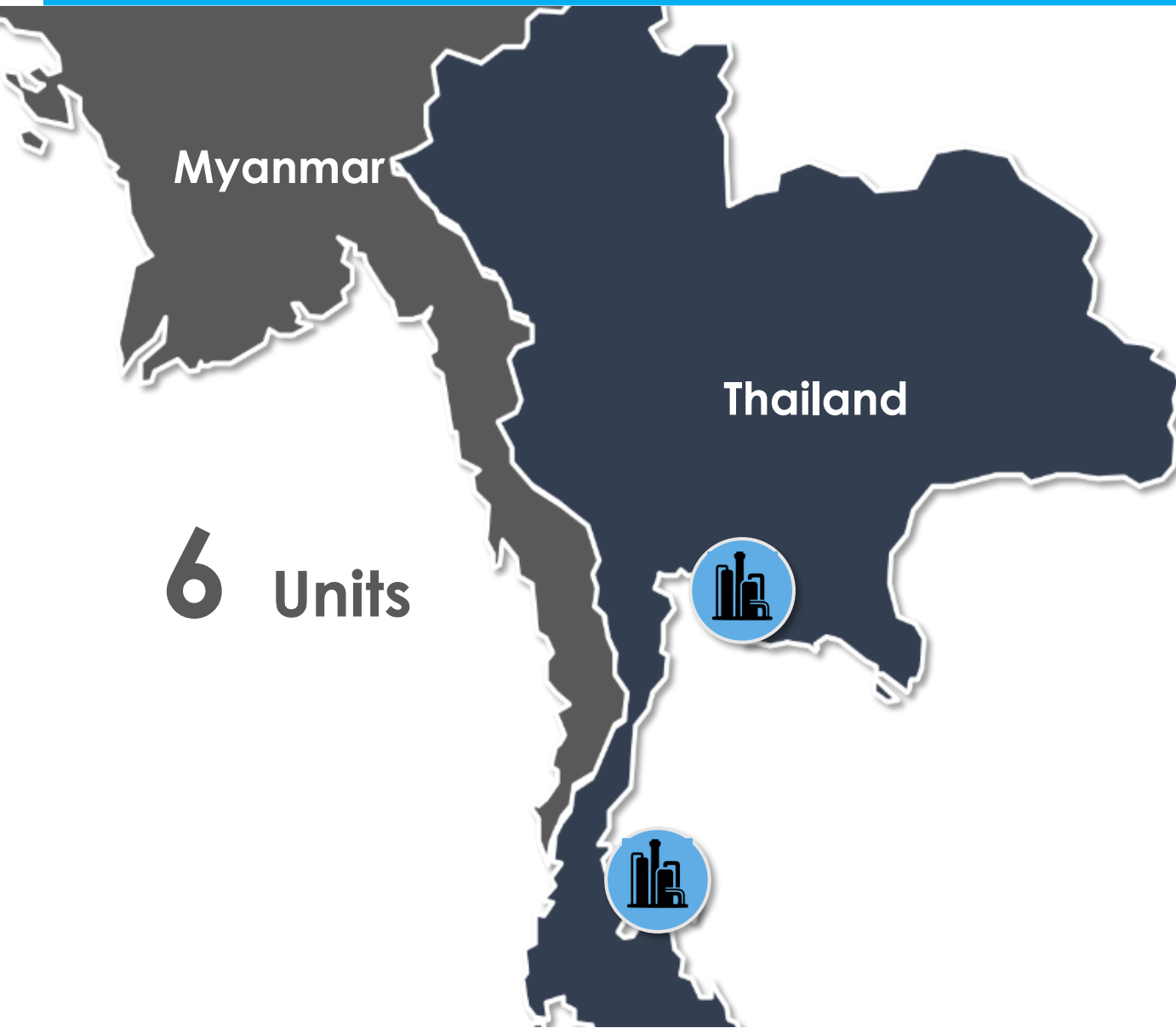
- ABOUT PTT
- BACKGROUND OF PROBLEM
- METHODOLOGY
- RIGOROUS MODEL SOLVING
- FUTURE PROJECT



PTT'S BUSINESS



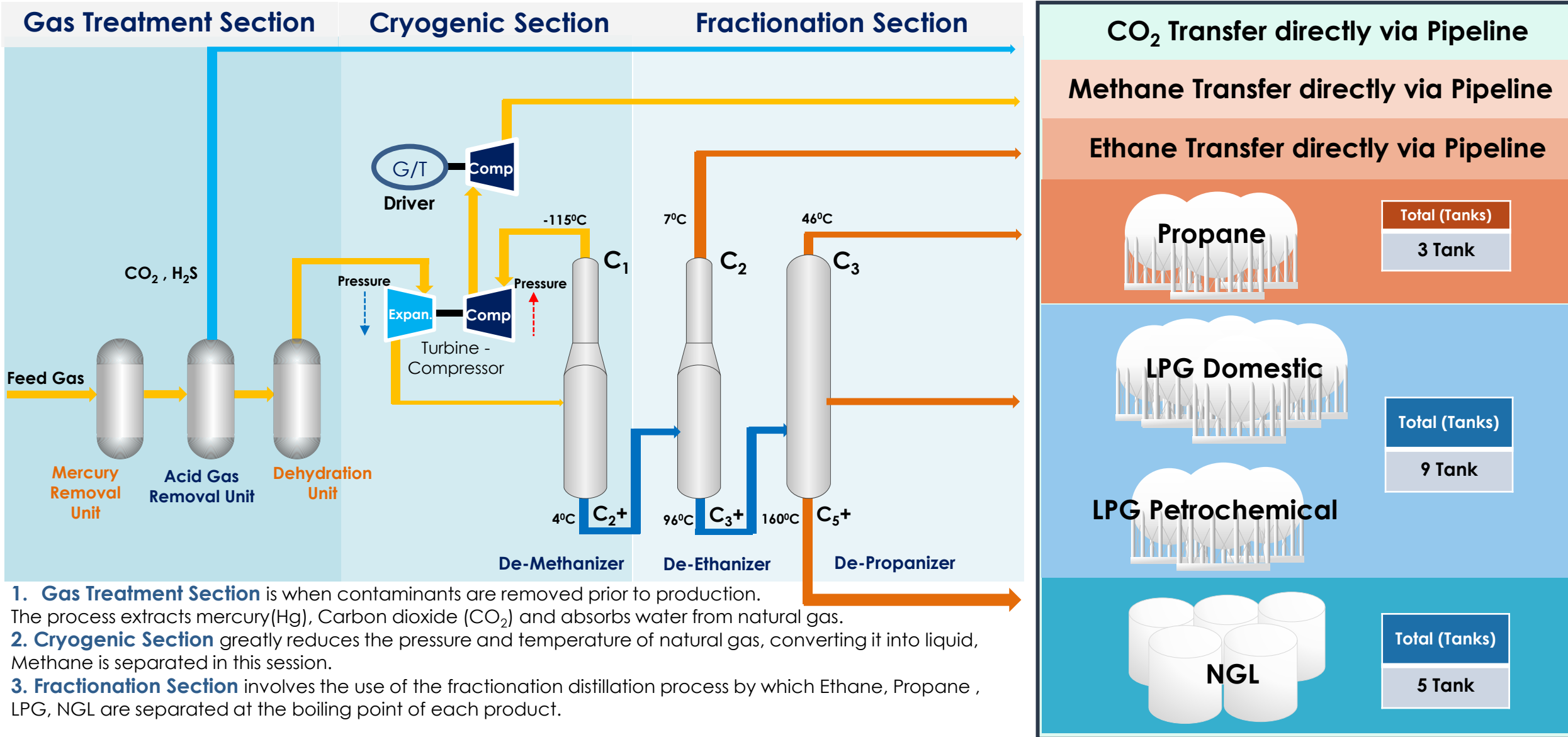
GSP : ROLE & RESPONSIBILITY



Gas separation plants are responsible for separating different types of hydrocarbon component from natural gas, **in order to create massive added value of natural gas**

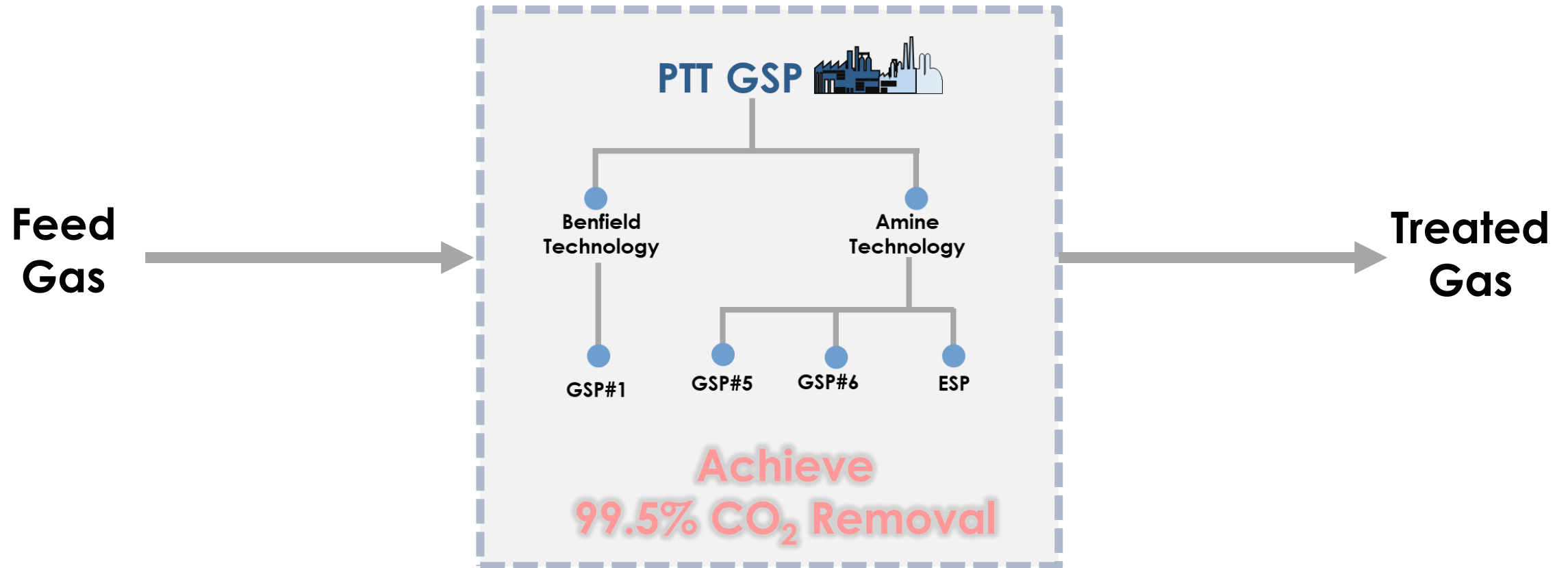
- 1** To Ensure Thailand's Energy Security
(LPG Domestic)
- 2** To manage and control natural gas quality
(Control Heating value of Natural gas to Power Plant)
- 3** To create added value of natural gas
(Petrochemical)

GSP'S PROCESS OVERVIEW



- 1. Gas Treatment Section** is when contaminants are removed prior to production. The process extracts mercury (Hg), Carbon dioxide (CO_2) and absorbs water from natural gas.
- 2. Cryogenic Section** greatly reduces the pressure and temperature of natural gas, converting it into liquid, Methane is separated in this session.
- 3. Fractionation Section** involves the use of the fractionation distillation process by which Ethane, Propane, LPG, NGL are separated at the boiling point of each product.

ACID GAS REMOVAL UNIT



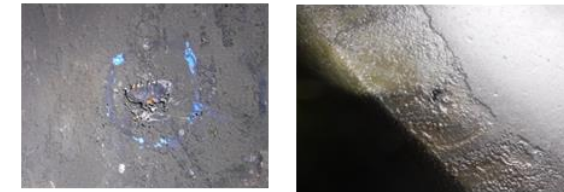
BACKGROUND OF PROBLEM

GSP#6

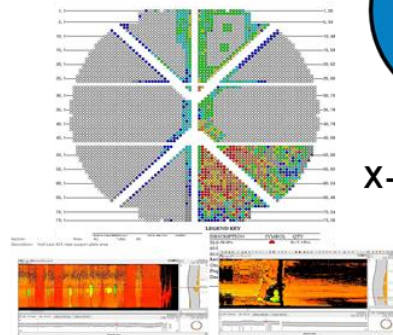


Fretting-Erosion-Corrosion Reboiler (CS)
AGRU1 : A,B,C,D
AGRU2 : A,B,C,D
2015-2016

Fretting-Erosion-Corrosion
X-Lane Reboiler (CS)
AGRU1 : C
AGRU2 : A,C,D
2018



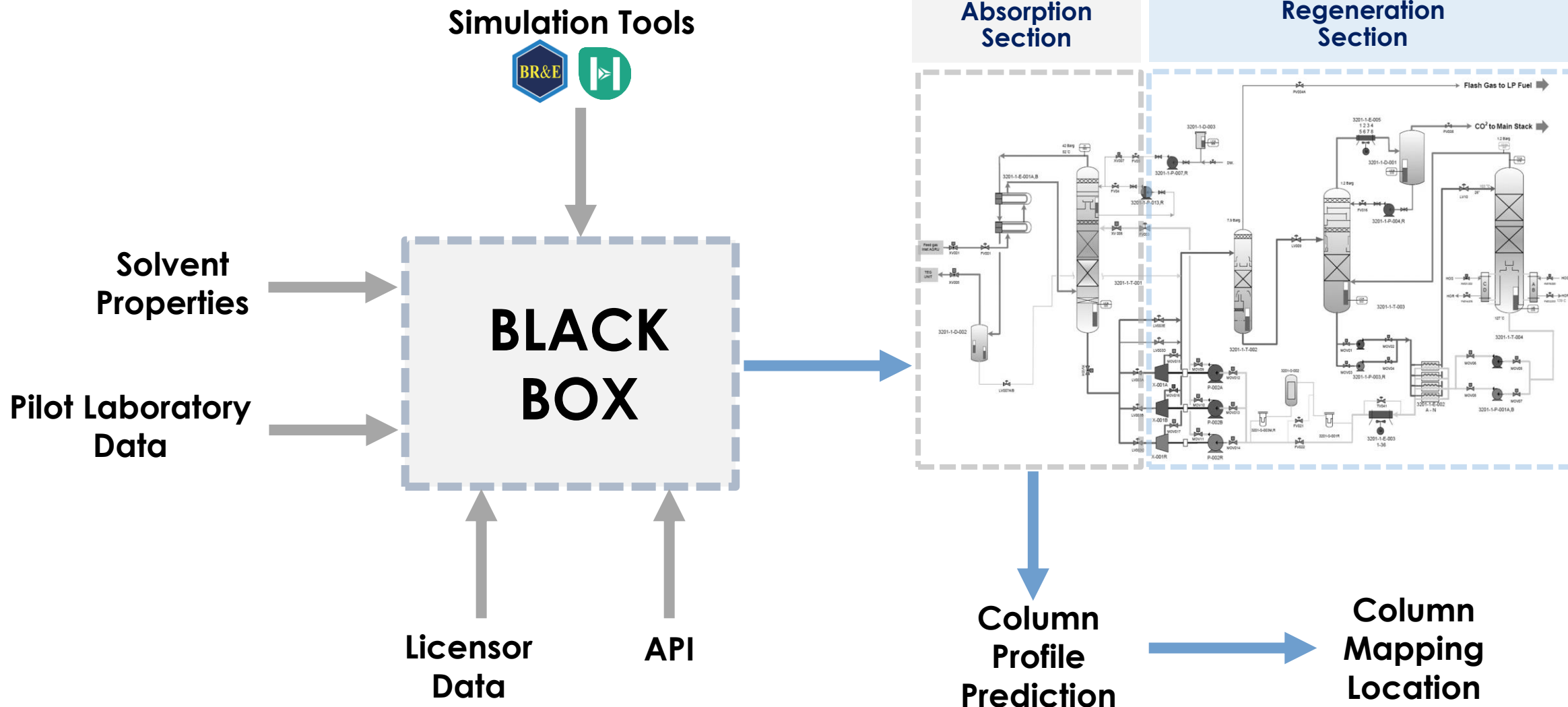
Column Corrosion
(3601-1,2-T-004)
2021



2018
X-Lane Reboiler
(CS)

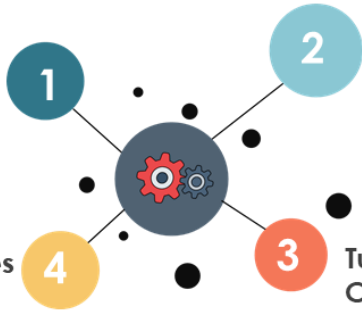
2018
Fretting-Erosion-Corrosion Reboiler
AGRU1 : A,B,C,D
AGRU2 : A,B,C,D

METHODOLOGY



METHODOLOGY

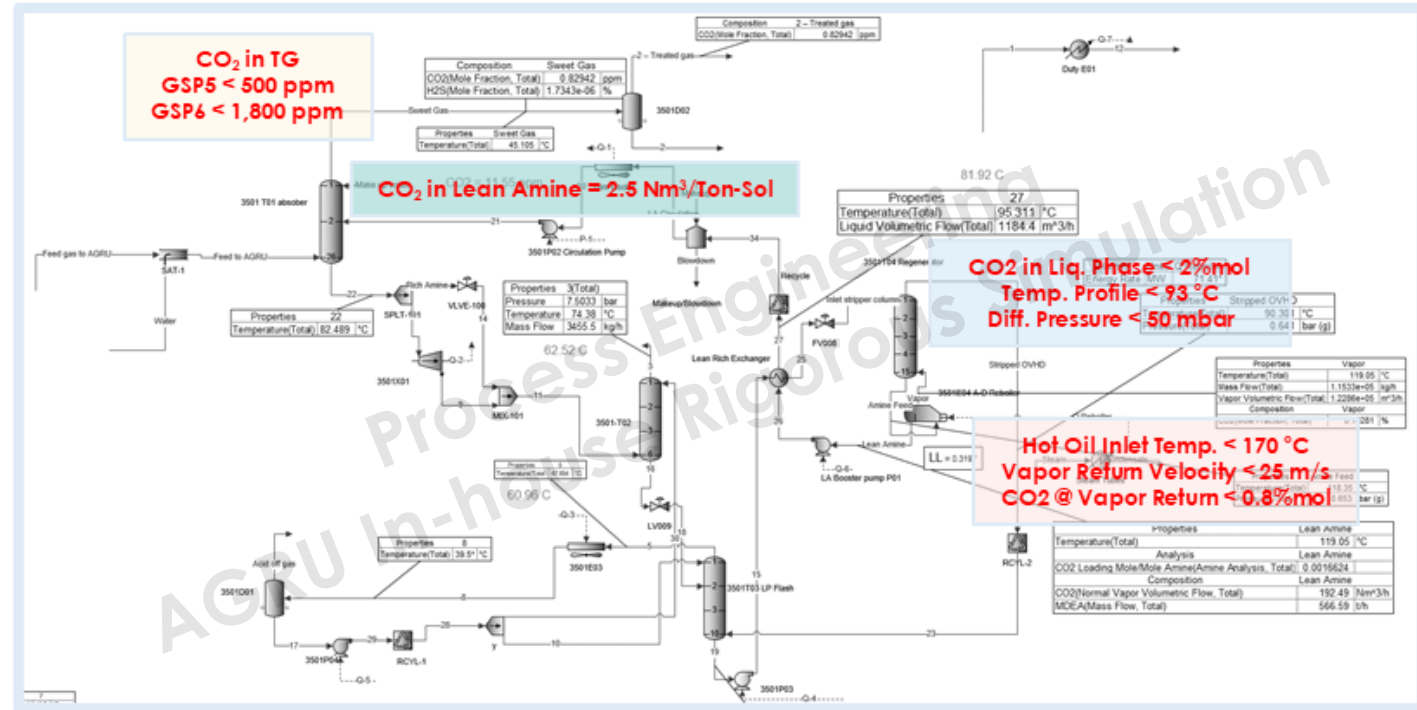
1. Collect and Analyze Actual Data 2018 -Current



2. Improve AGRU Rigorous Simulation by Adjust Reboiler Duty

4. Analyst Result Chooses the Optimize Condition to Operate

3. Tuning Simulation with Compare Criteria

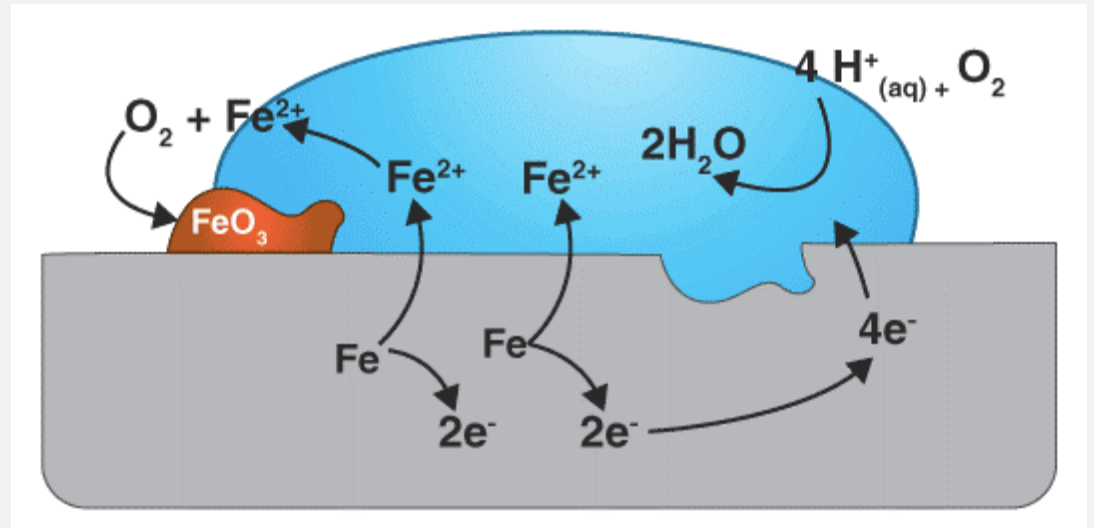


PROBLEM ANALYSIS

Column Corrosion

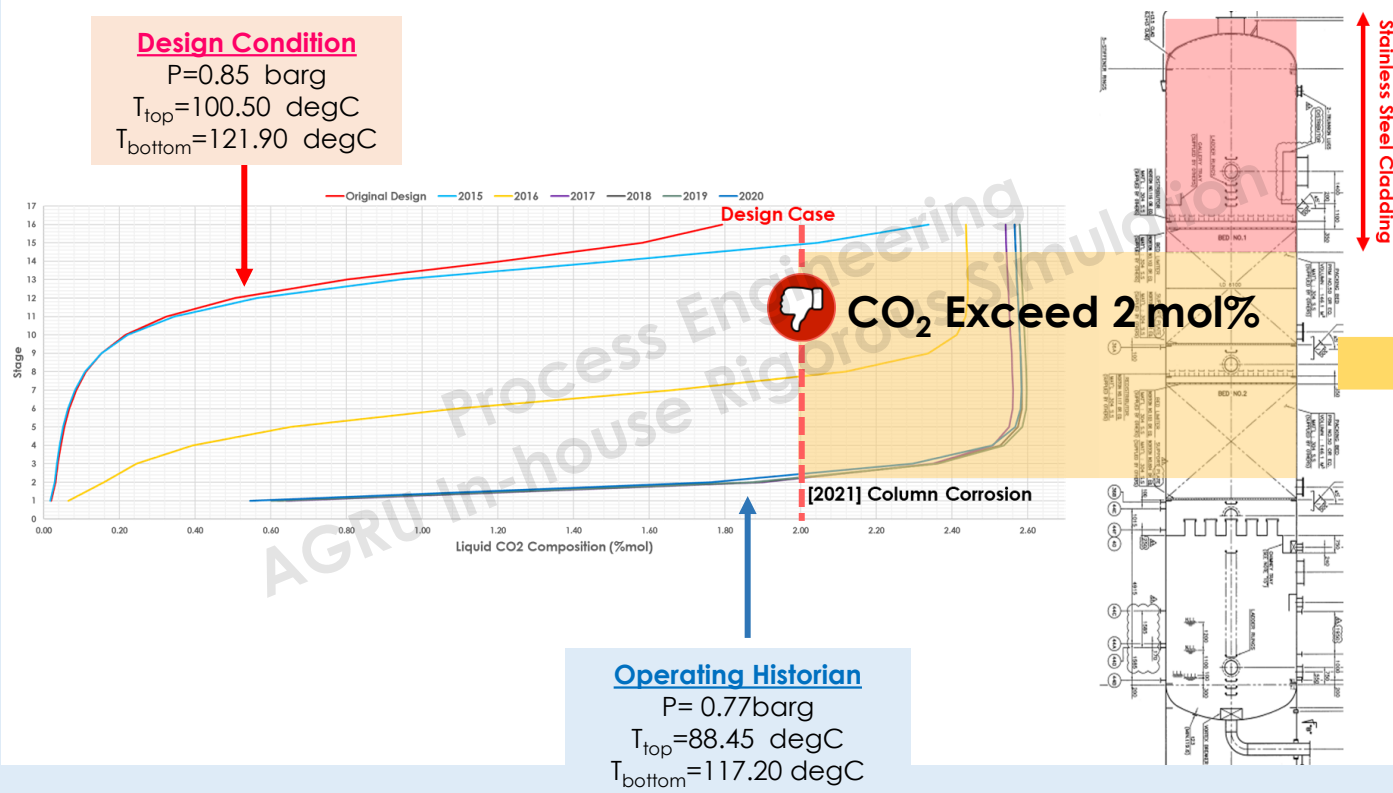
Corrosion

- Operate at **Low Temperature**
- Increase **CO₂ in Liquid Phase**
- **CO₂+H₂O → H₂CO₃ (Acid)**
- Increase CO₂/H₂S : Increase Corrosion
- **API571 : CO₂ (Liquid Phase) > 2%mol**

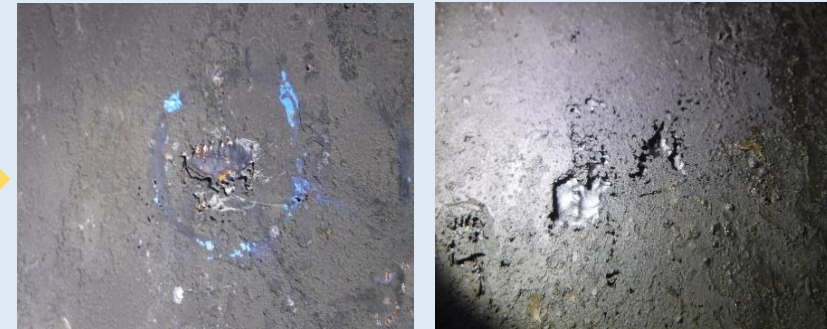


RIGOROUS MODEL SOLVING

Column Corrosion



GSP6 Inspection report



- CO₂ > 2 %mol at Design Case **over** Stainless Steel Cladding
- CO₂ > 2 %mol at Actual Operating Condition from 2015 to present **under** Stainless Steel Cladding
- 2021(Turnaround) as found corrosion to bottom of Amine Stripper Column

CURRENT PREVENTION

Short Term Improvement

GSP6



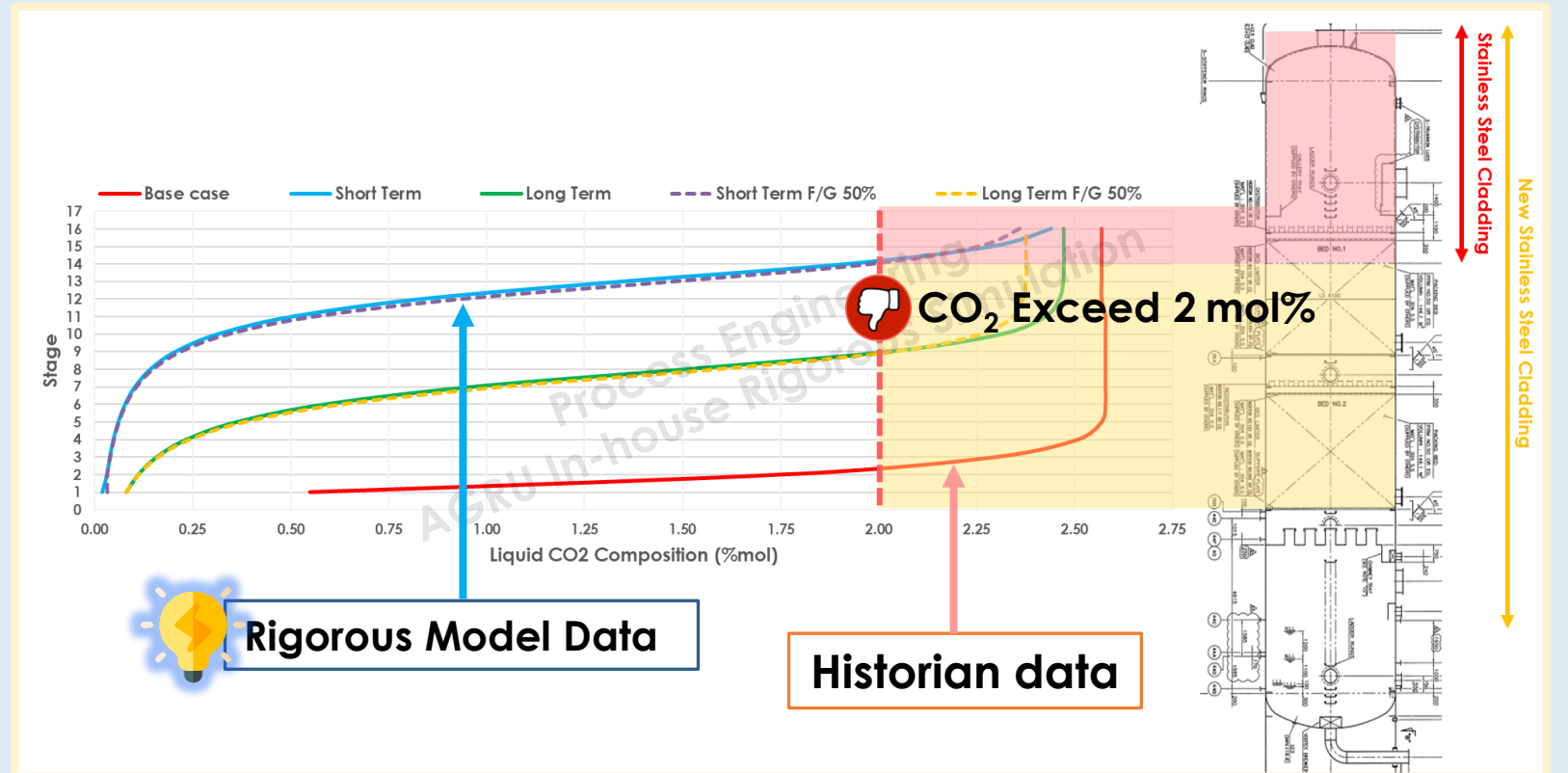
RIGOROUS MODEL

Operating Condition Guideline

- Set-up New Operating Condition
- CS Material CO₂ < 2 mol%

Short Term

- Pressure = 0.85 barg
- Top Temp. = 92.4 °C



CURRENT PREVENTION

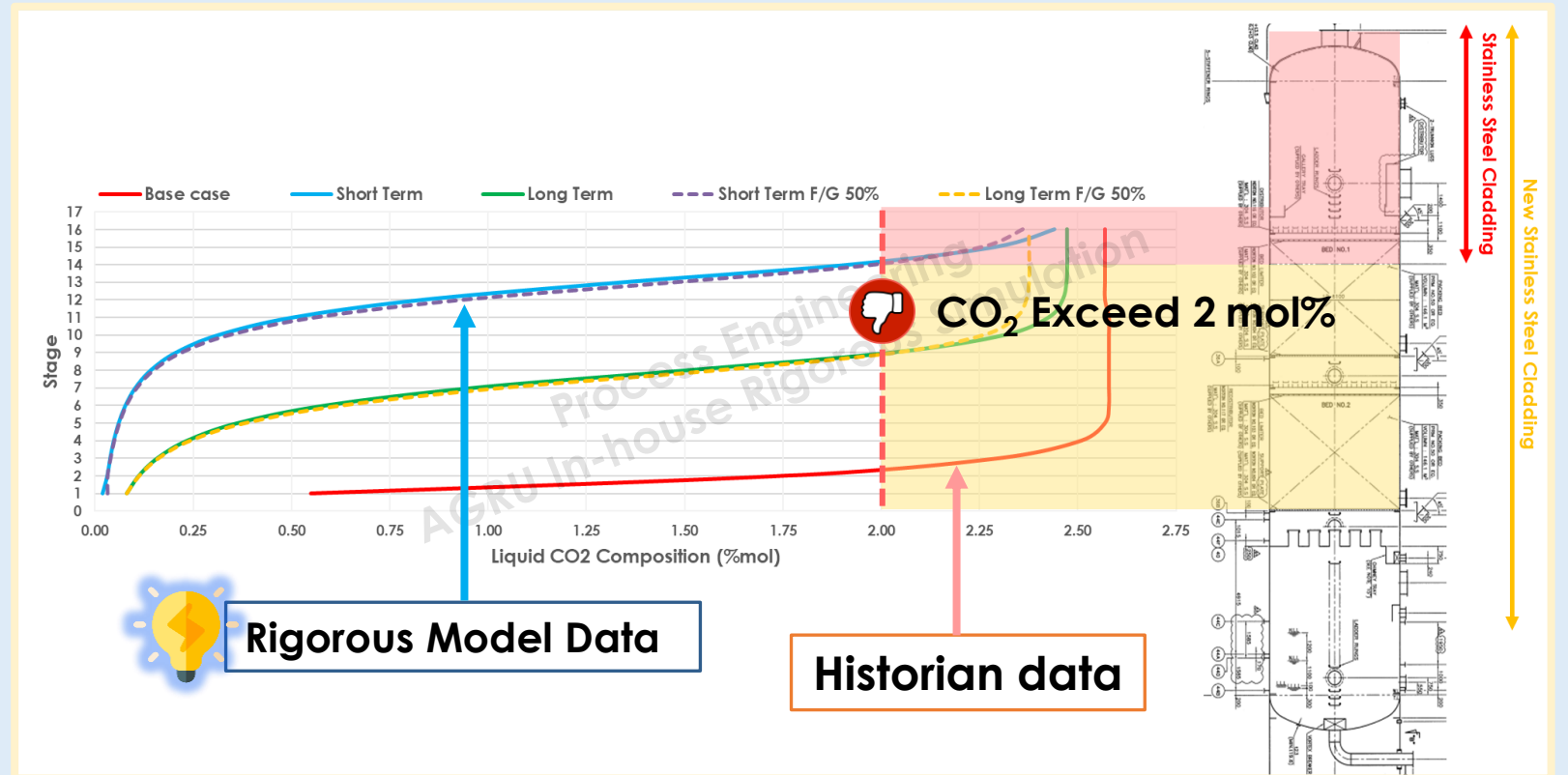
Long term improvement

GSP6



RIGOROUS MODEL

- Suggestion to Investment New Design Column
- NEW Design Column Configuration
- Reliability and Energy Optimize



NEW GSP7 DESIGN COLUMN

GSP7 AGRU Material Selection

Required Maintenance Practices Design – Acid Gas Removal Unit (AGRU)

- Amine stripper reboiler design shall be
 - Thermosiphon type and the material shall be corrosion resistant at least SS316L.
 - Proper temperature indicator at inlet and outlet of the unit.
 - Each reboiler shall be designed for fully isolation in order to perform online individually replacement.
- Licensor to confirm
 - The MSD of latest recommended practices.
 - The design shall confirm no erosion and no corrosion.
 - The Regeneration column shall have the SS316L internal cladding entire column.



Feed Gas 460 mmscfd @CO₂ 23 mol%

SUMMARY

Benefit outcome

Prediction Profile in Column

- CO₂ Concentration Profile
- Temperature and Pressure Profile

Prediction Corrosion Profile

- Corrosion Area Zone
- Optimal Condition to Prevention Corrosion

Design Column Configuration

- Material Selection
- Column Configuration

Long Term

Minimize Corrosion Rate


- Full Cladding Stainless Steel between Upper Packing Bed to Lower Packing Bed

Set Up New Operating Window for Optimization

- Achieve CO₂ in Liquid API 571 Below CO₂ 2 %mol in Liquid Phase

Energy Saving

Area	Energy Saving
GSP5	5.5%
GSP6	5.6%
ESP	6.3%



**COST
SAVING
>100
MB/Year**

THANK YOU
