



CARBON DIOXIDE CAPTURE BY CHEMICAL ABSORPTION

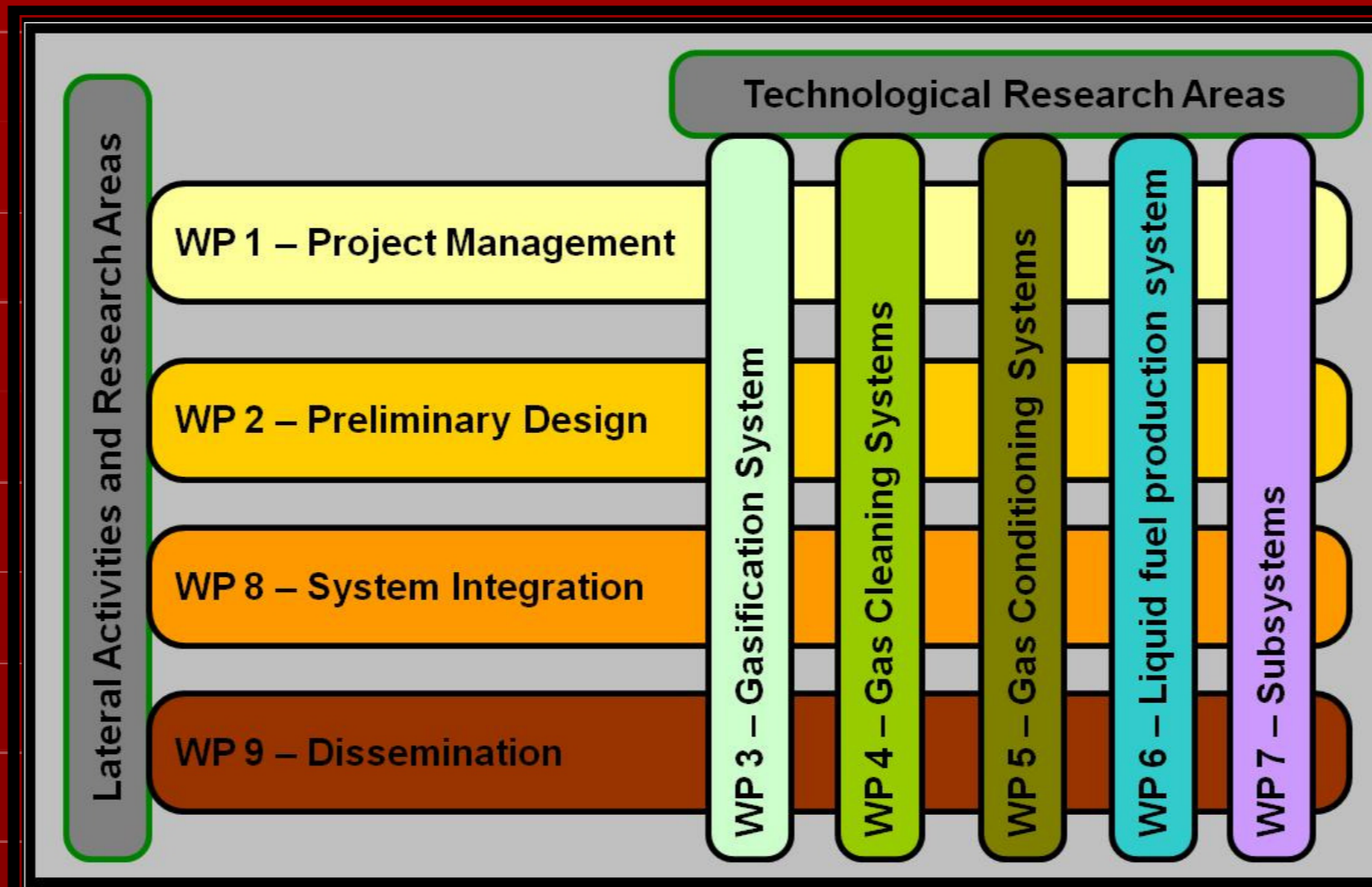
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CO₂ Capture and Storage Regional Awareness-Raising Workshop, 13-14 June 2012
Middle East Technical University, Ankara, TURKEY

PROJECT SCOPE

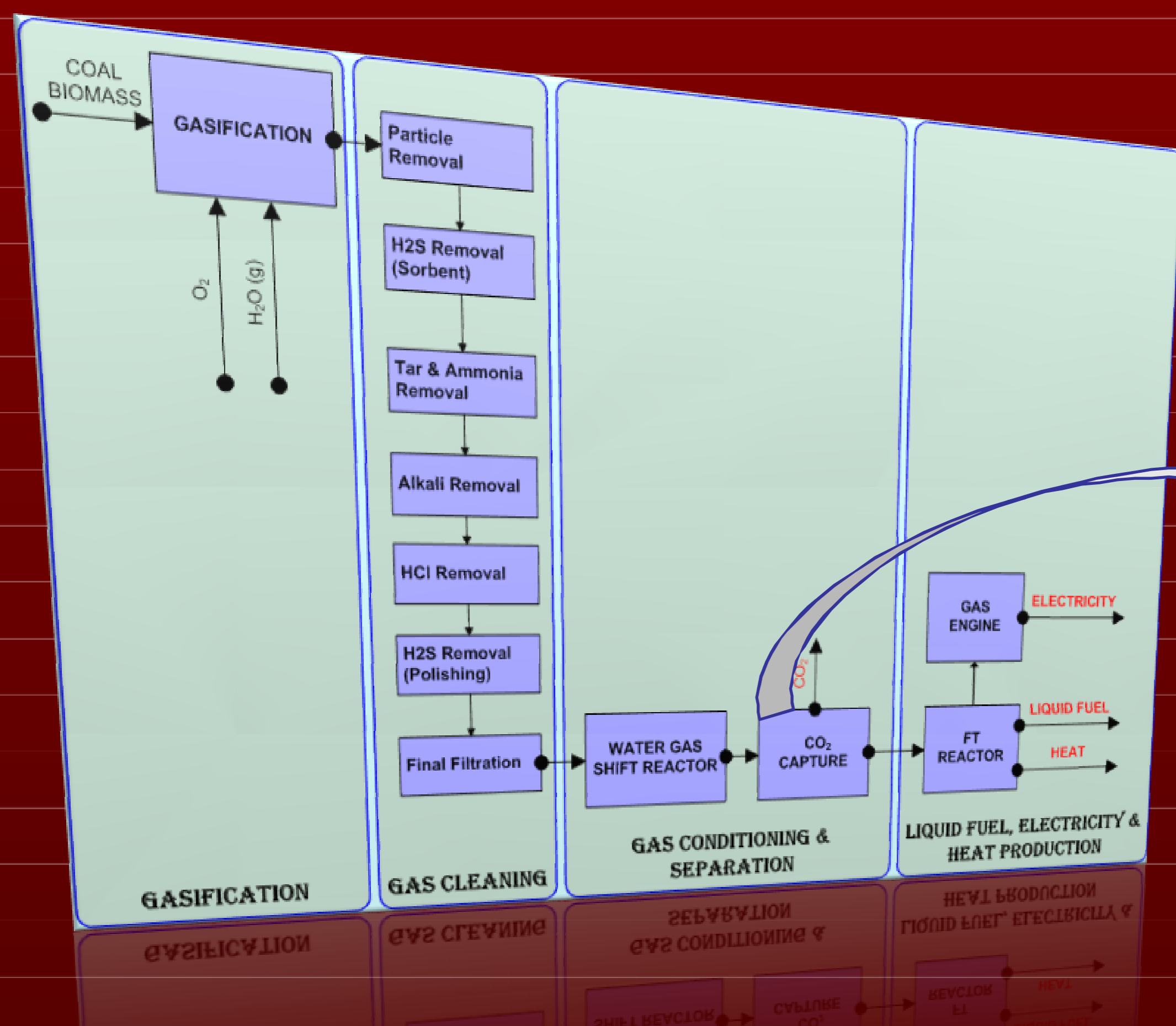
Project Name : Liquid Fuel Production from Biomass and Coal Blends
Supporting Organization : The Scientific and Technological Research Council of Turkey (TUBITAK)
Program Code : 1007 (Supporting Program for Research & Development Projects of Public Institutions)
Project Start Date : 15 June 2009
Project Duration : 48 months



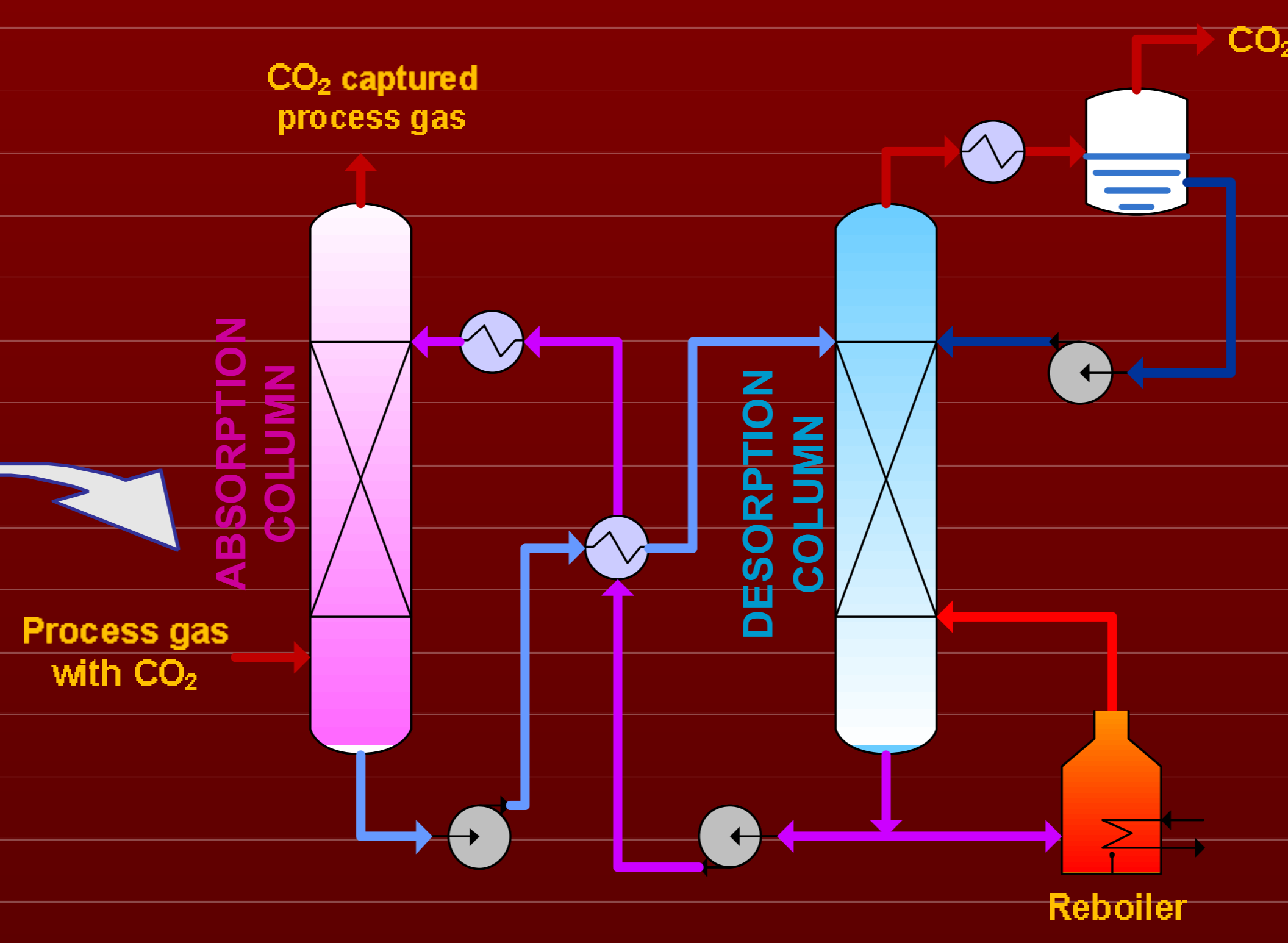
PROJECT ACTIVITIES

- Applied research and new technology development will be conducted through the following key topics with this project;
- Coal and biomass gasification technologies
 - Gas cleaning technologies
 - Gas conditioning technologies
 - CO₂ separation technologies
 - Syngas to liquid fuels conversion technologies
 - Usage of syngas for power generation technologies

TRIJEN PROCESS FLOW DIAGRAM

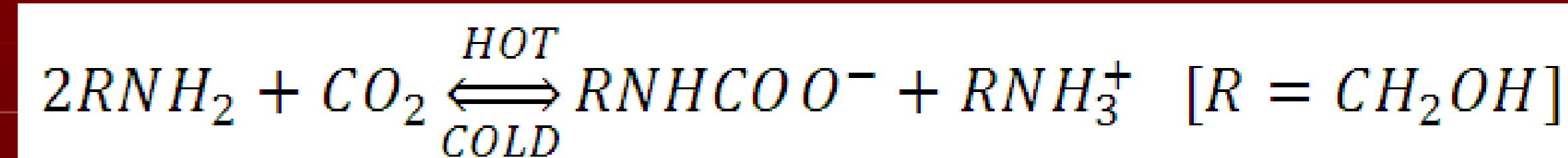


CO₂ CAPTURE PROCESS FLOW DIAGRAM

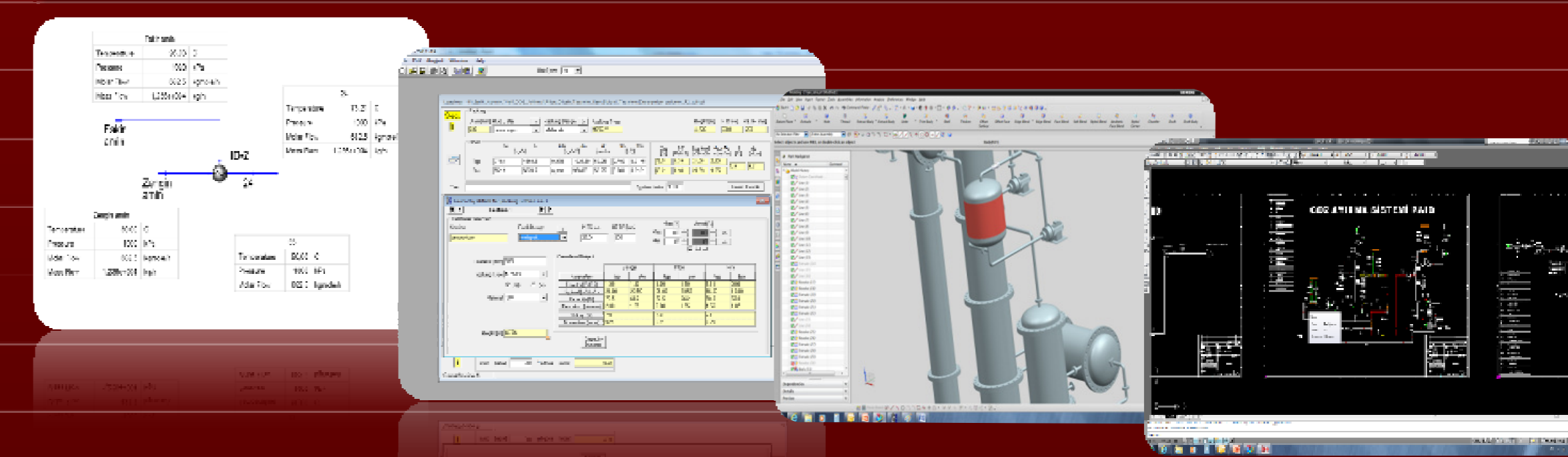


AIM & METHOD of CO₂ CAPTURE

- CO₂ capture from synthesis gas before Fischer-Tropsch (FT) process
- Chemical absorption technology
- Structured packings inside columns
- Chemical absorbent: Monoethanolamine (MEA)



MODELLING & DESIGN



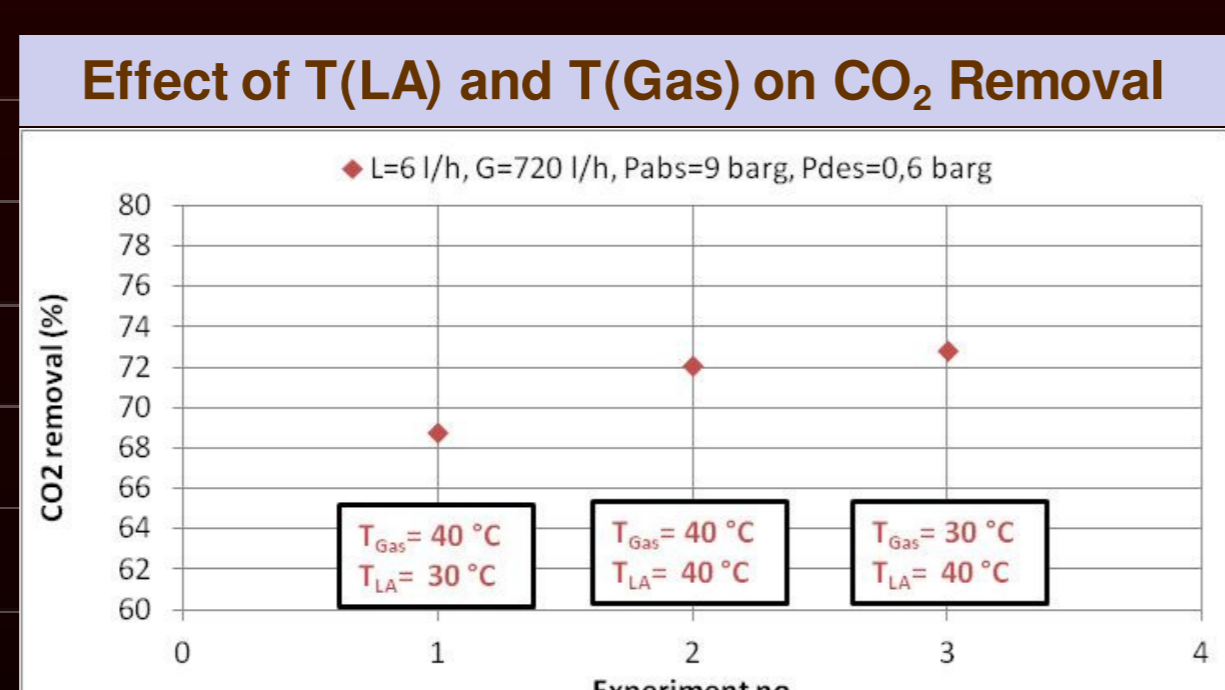
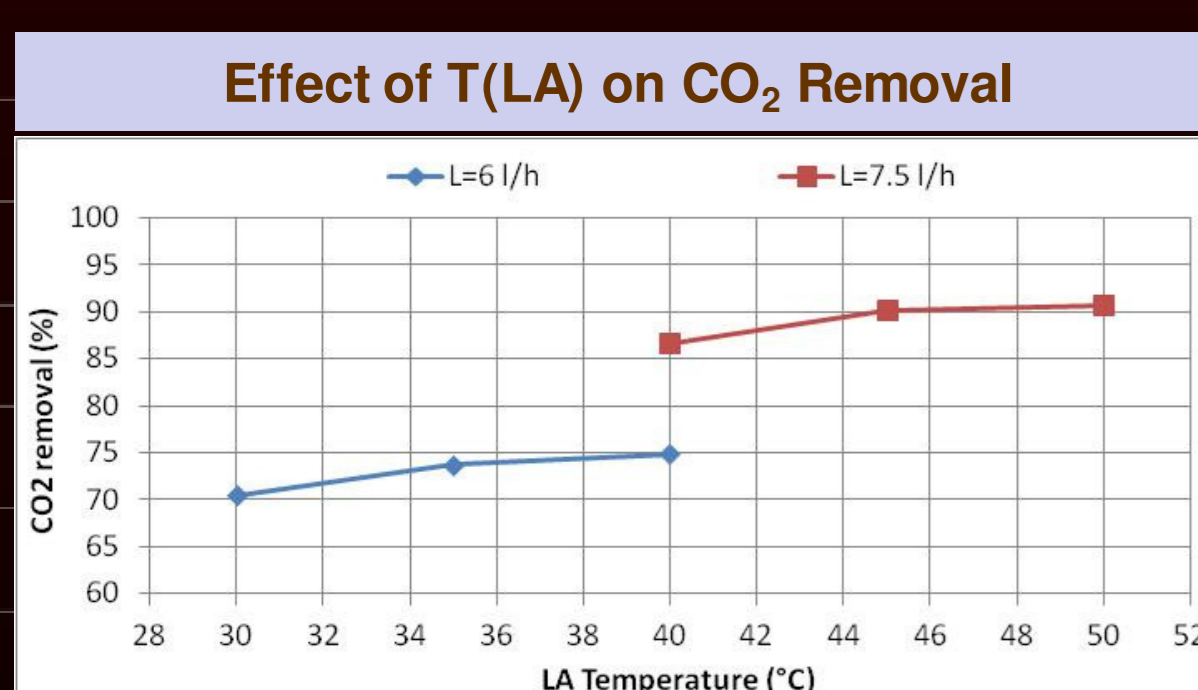
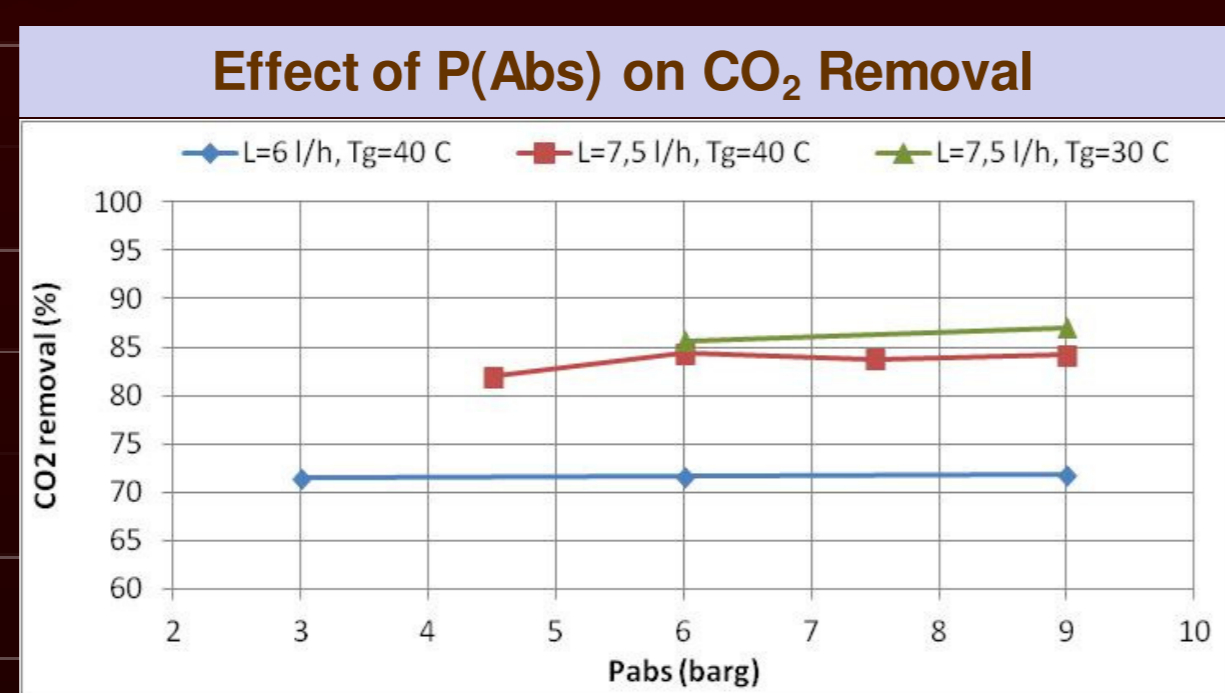
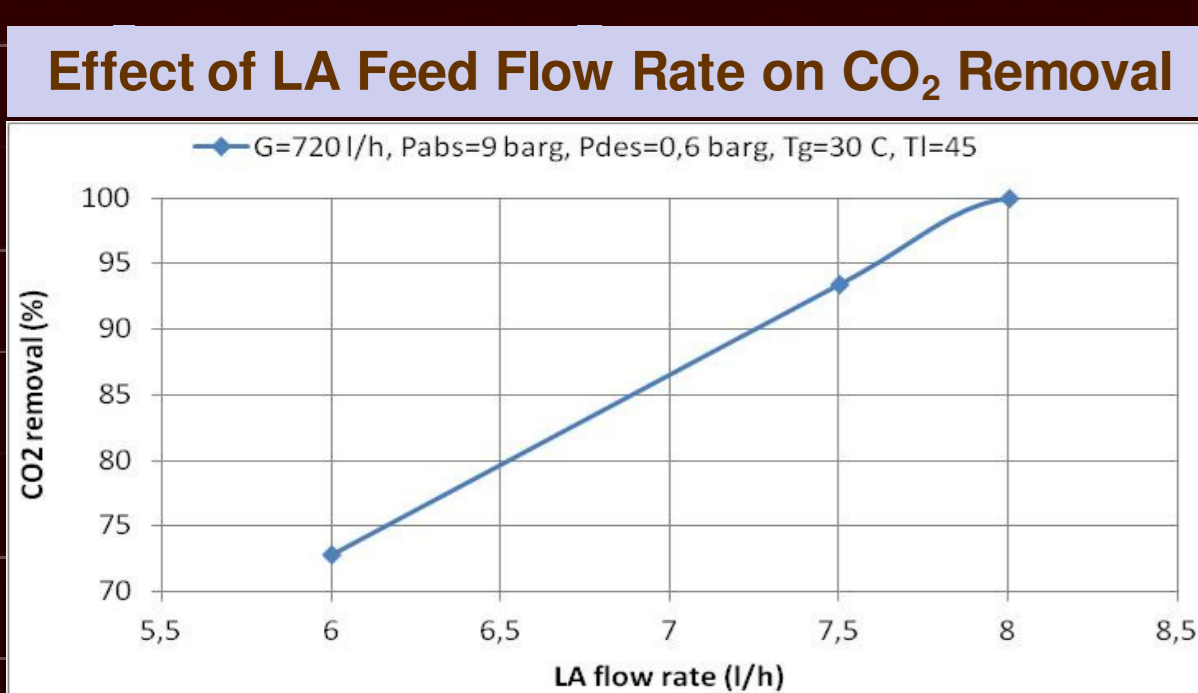
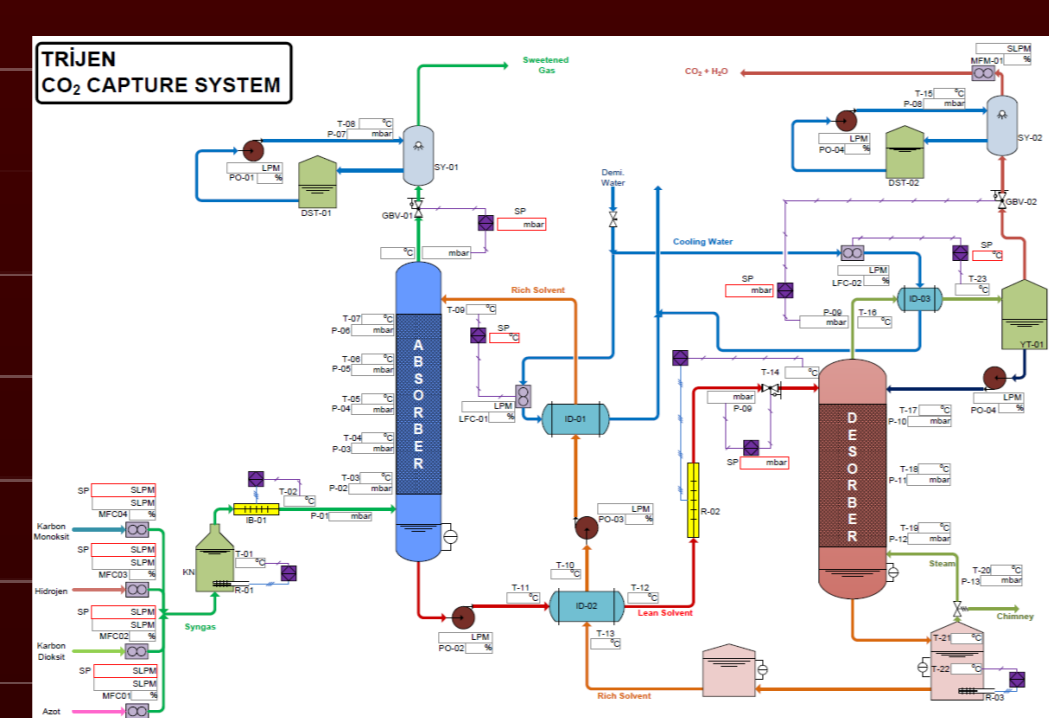
✓ Aspen HYSYS ✓ SULCOL Revision 2.0.9 ✓ SIEMENS NX 7.5 ✓ AutoCAD

LABORATORY SCALE TESTS

- Column hydrodynamic tests
- Absorption column operation pressure: 2 – 10 bara
- Desorption column operation pressure: max. 2 bara
- Absorption column operation temperature: 40 – 60°C
- Desorption column operation temperature: 100 – 120°C
- Gas and liquid analysis by gas chromatography
- LA: Lean Amine

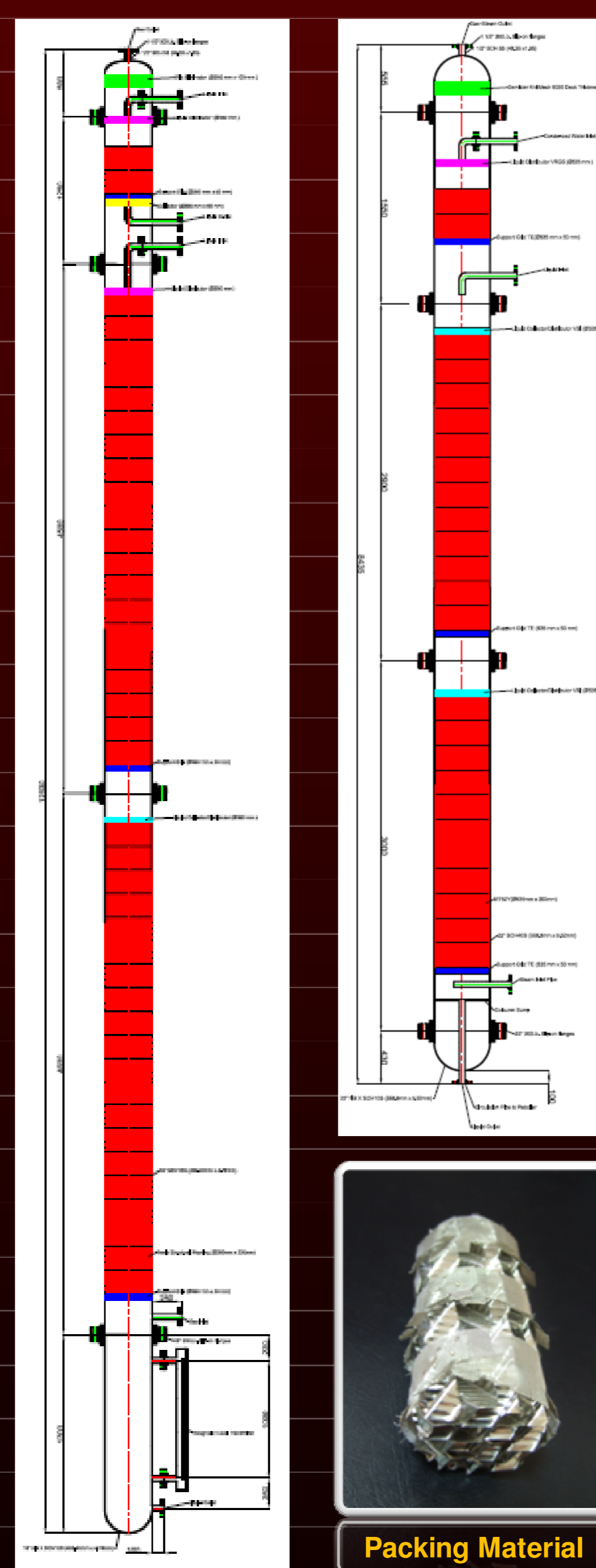


- ❖ For 99% CO₂ removal (G = 480 l/h):
 - 10% MEA → 11 l/h LA
 - 20% MEA → 5 l/h LA
- ❖ Increasing P_{abs} increases CO₂ removal
- ❖ Increasing LA flow rate increases CO₂ removal
- ❖ Increasing T_{LA} increases CO₂ removal (T_{Gas} constant)
- ❖ Increasing T_{Gas} increases CO₂ removal (T_{LA} constant)
- ❖ Optimum feed temperatures; LA → 45°C and Gas → 30°C

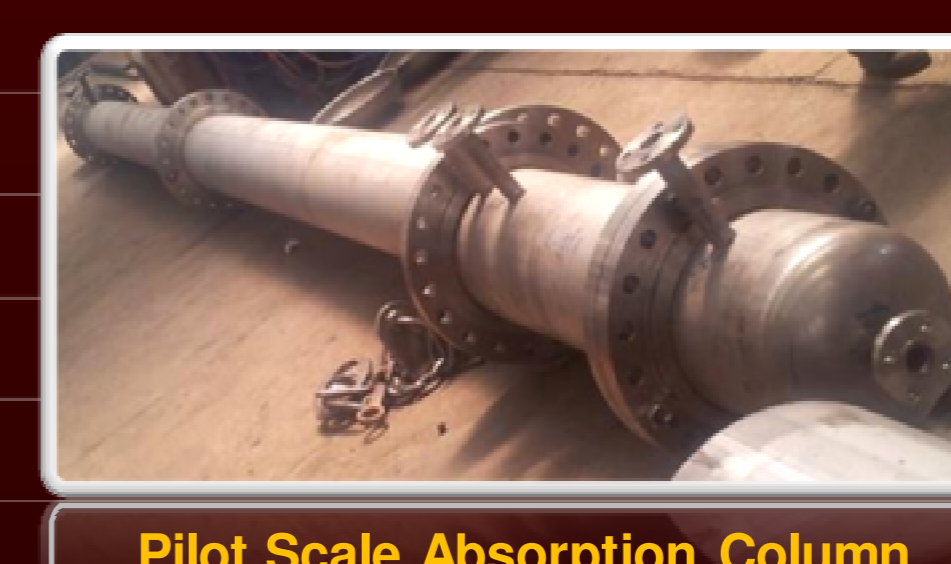


SCALE-UP of CO₂ CAPTURE PILOT PLANT

Pilot Scale Absorption & Desorption Columns



Pilot Scale 3D Layout



Total gas treated (kg/h)	395
CO ₂ Content (%)	20-30
Removal Percent (%)	90-95
Packing Type	Structured

CONTACT INFORMATION

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PROJECT CONSORTIUM

Customer Organizations

YEGM General Directorate of Renewable Energy (YEGM)
Administration Turkish Coal Enterprises (TKİ)

Project Partners

TÜBİTAK Marmara Research Center (Project Manager)
İstanbul Technical University
Marmara University
UMDE Engineering, Contracting and Trading Co. Ltd.
HABAŞ Industrial and Medical Gases Production Industries Inc.

