



MEMBRANE
TECHNOLOGY & RESEARCH

Phase III: Large Pilot Testing of the MTR Membrane Post-Combustion CO₂ Capture Process

(DE-FE0031587; FOA 1788)

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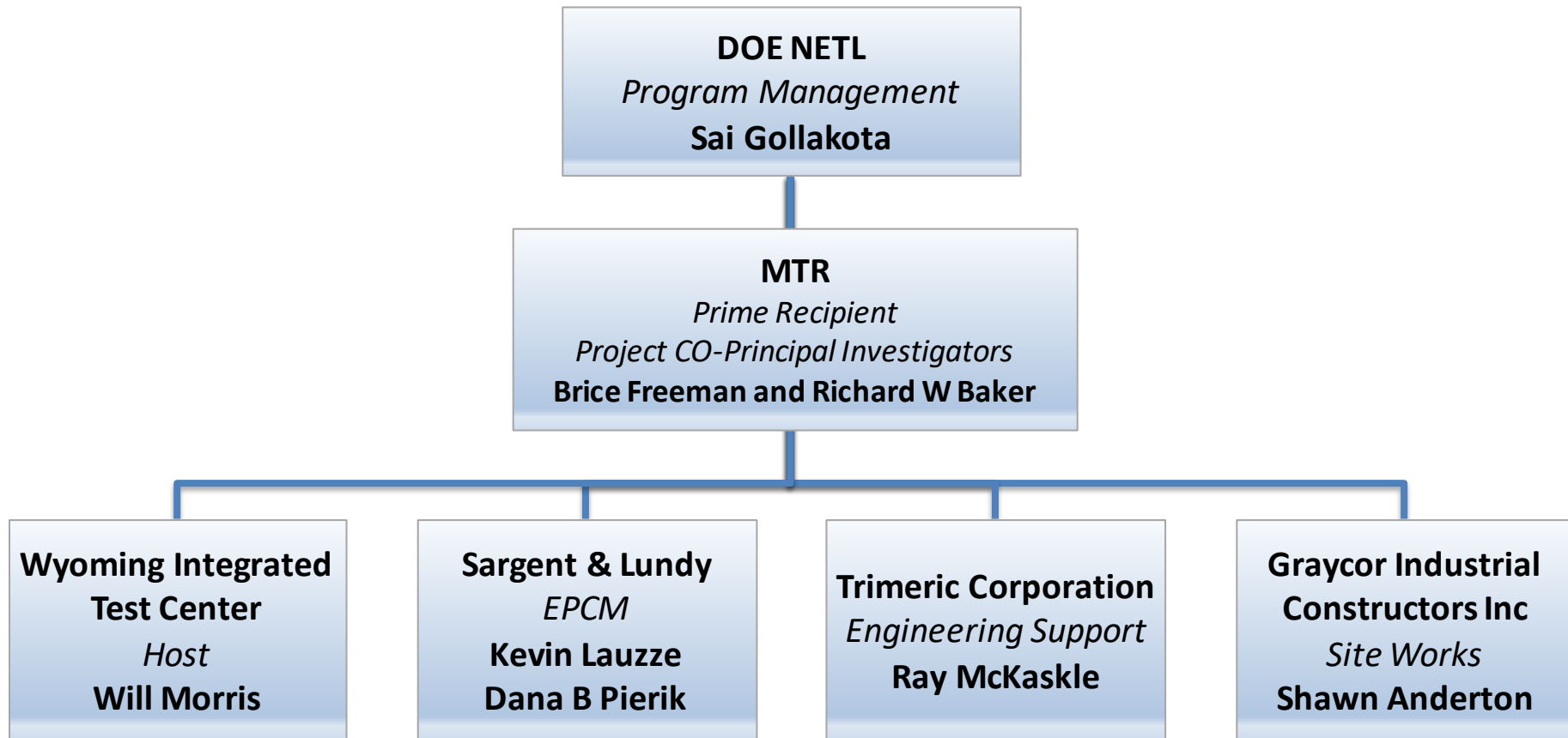
NETL FY21 Project Review Meeting
August 12, 2021

Project Overview

- **DOE-NETL Project Manager:** Sai Gallokota
- **Project Team:** MTR (prime), Sargent & Lundy, WITC, Basin Electric (Host), Trimeric
- **Overall Goal:** Design, build, and operate a 10 MW_e large pilot membrane capture system

Phase I	Phase II	Phase III
<ul style="list-style-type: none">• Feasibility• Site selection• Create team <p>\$1.2 million</p>	<ul style="list-style-type: none">• FEED study• Permitting <p>\$3.8 million</p>	<ul style="list-style-type: none">• Build, operate, and demonstrate process performance and costs <p>\$64.7 million</p>

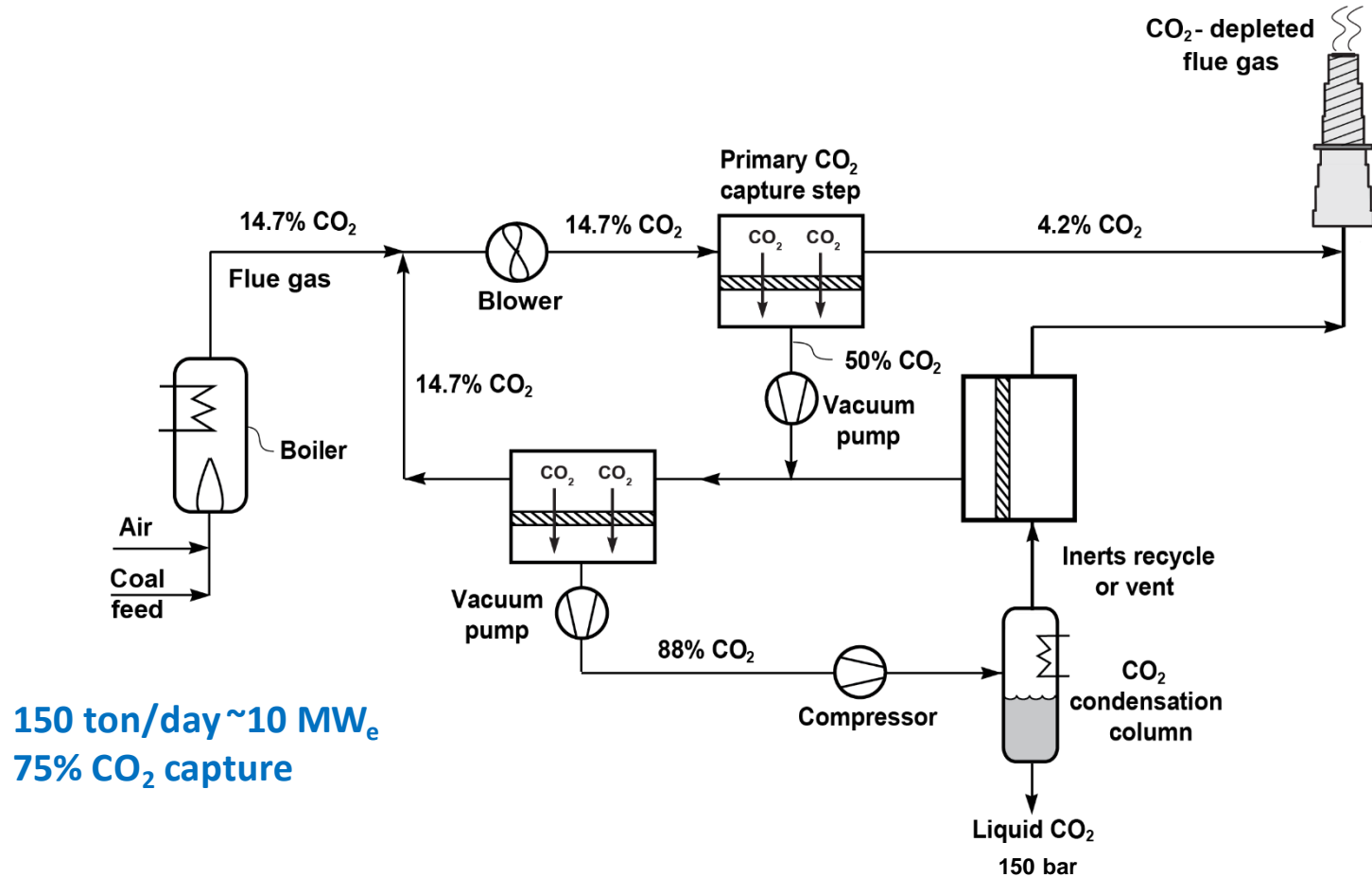
The Project Team



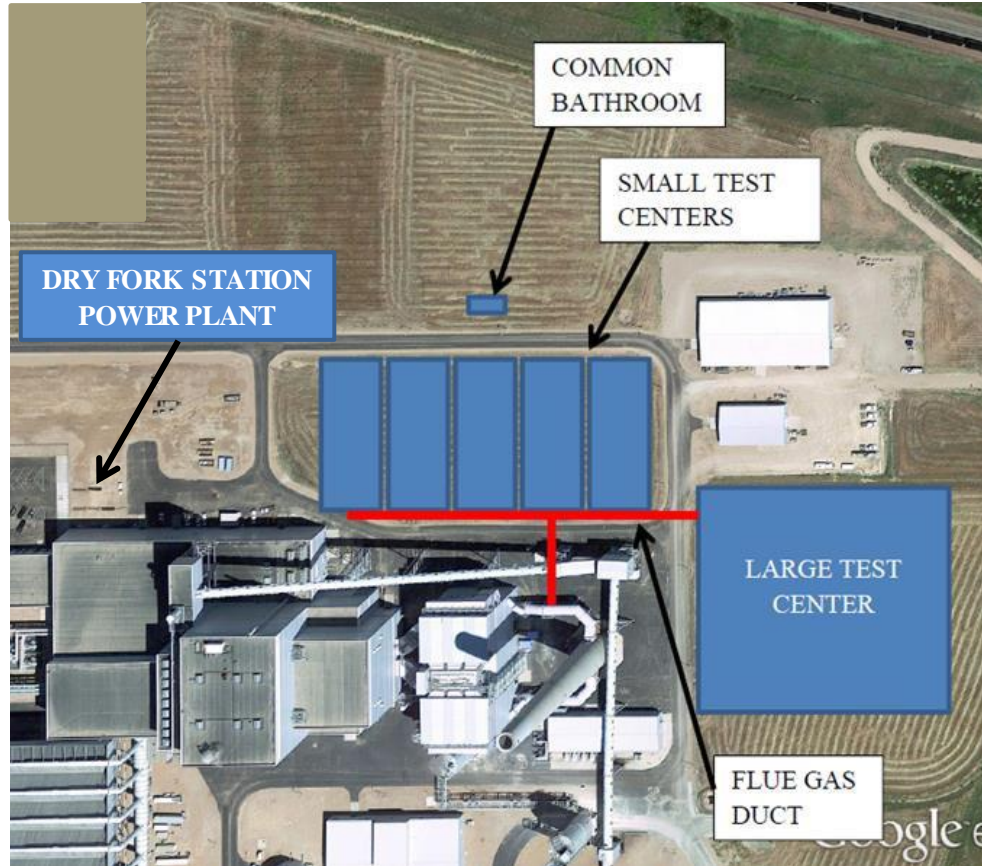
Phase III Roles and Responsibilities

- Phase III project: \$64.7 million / October 1, 2021 - August 30, 2026
 - **WITC**: Host site
 - **MTR** (prime): Fabrication of the membrane unit and operation of the system
 - **Sargent & Lundy**: Management of system detail design, supervision of site works and system installation
 - **Trimeric**: Engineering support
 - **Graycor Industrial**: Site works and installation of the system

The MTR CO₂ Capture Design



Basin Electric's Dry Fork Station



- The Wyoming Integrated Test Center at Basin Electric's Dry Fork Station
- Modern power plant, full controls
- High CO₂ concentration flue gas
- Test center can supply 20 MW_e of gas
- Power, utilities and flue gas connections in place
- Immediately adjacent to WY CarbonSAFE injection site
- Six miles from an existing CO₂/EOR pipeline

Outcomes of the Phase III Program

- Demonstration of the total process at a relevant scale (DCC, membrane separation unit, CPU, delivers liquid CO₂)
- Technology moves from TRL-6 to TRL-7
- Validation of membrane unit skids, the building blocks of future systems
- Scale-up and cost reduction
 - Module skid cost reduced by 50% in this program

MTR Testing at the National Carbon Capture Center (1 MW_e)

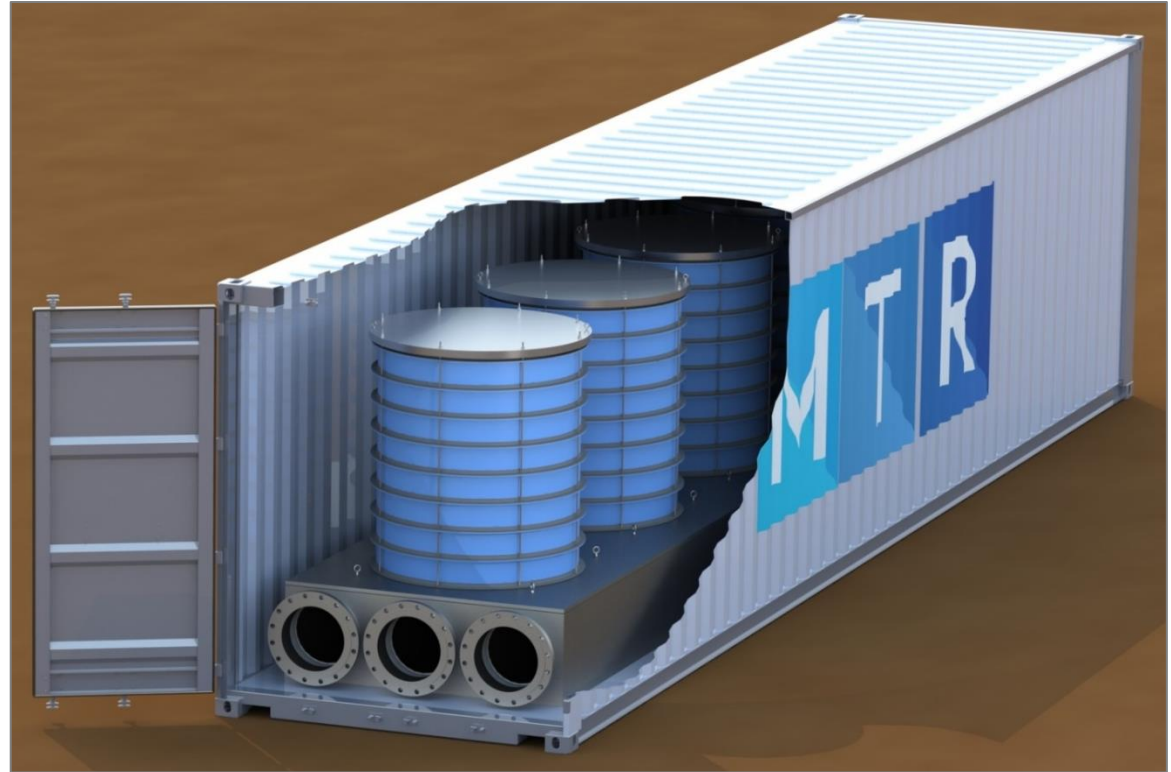


Spiral modules had large feed-to-residue
pressure-drops and a large footprint



Plate-and-frame modules cut footprint
pressure-drops and cost in half

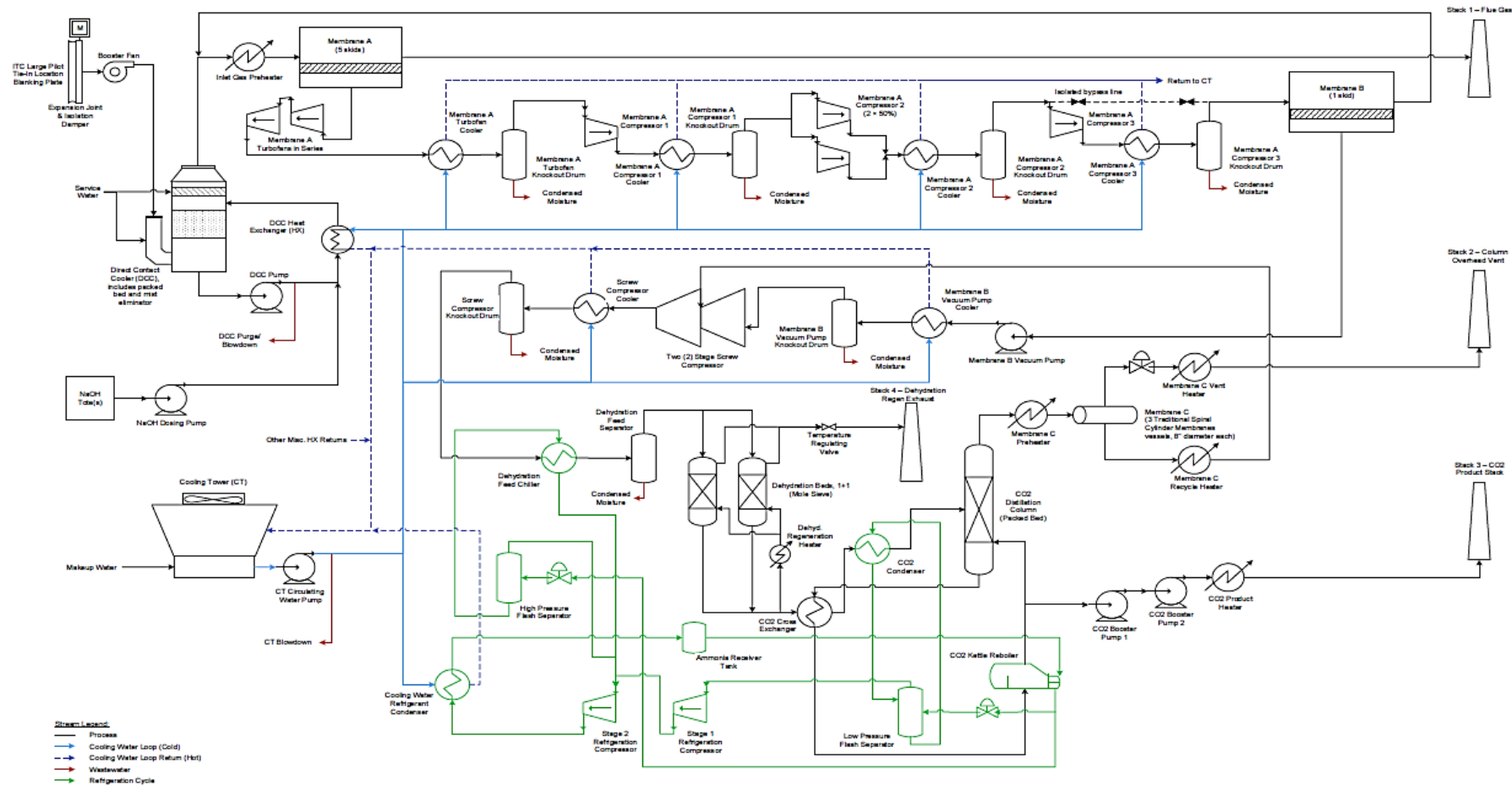
The Large Pilot will Evaluate Stainless-Steel and Lower-Cost Plastic Housings in a Container-Sized Skid



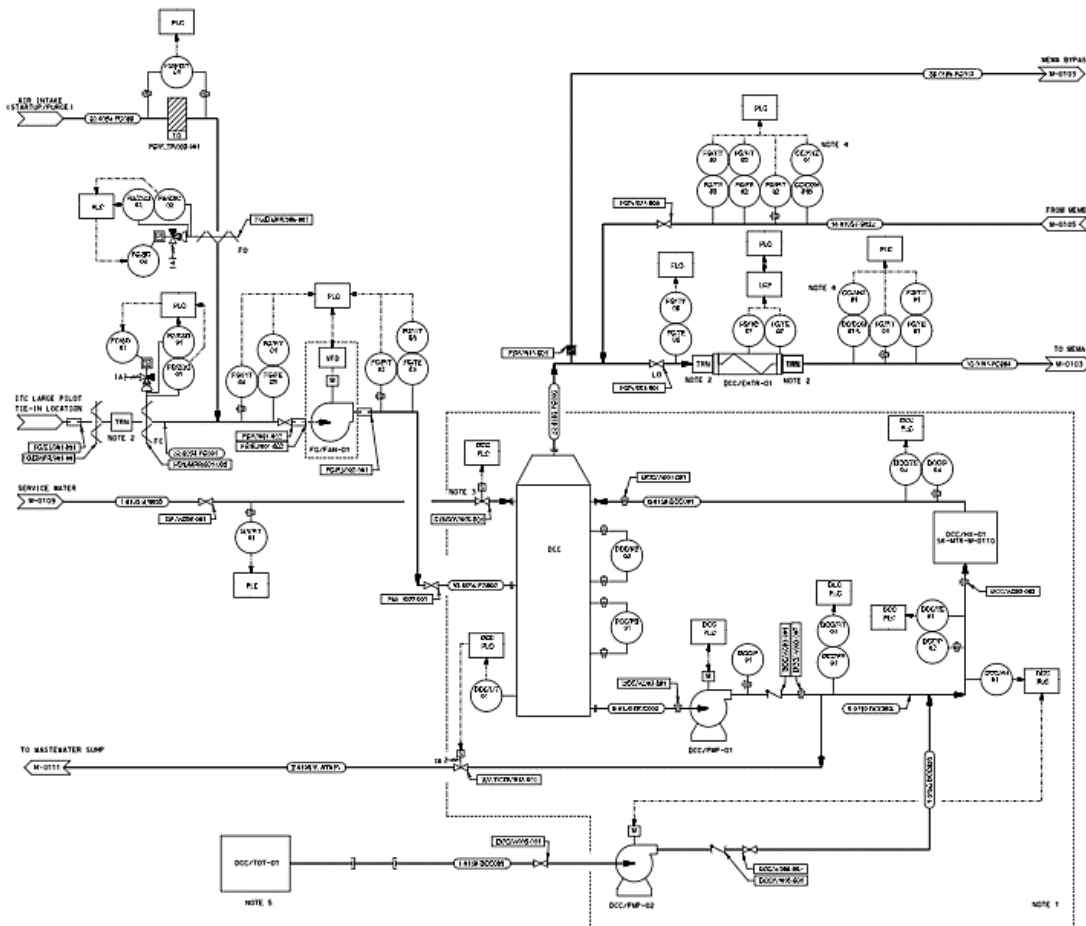
The TNO Test Unit During Installation



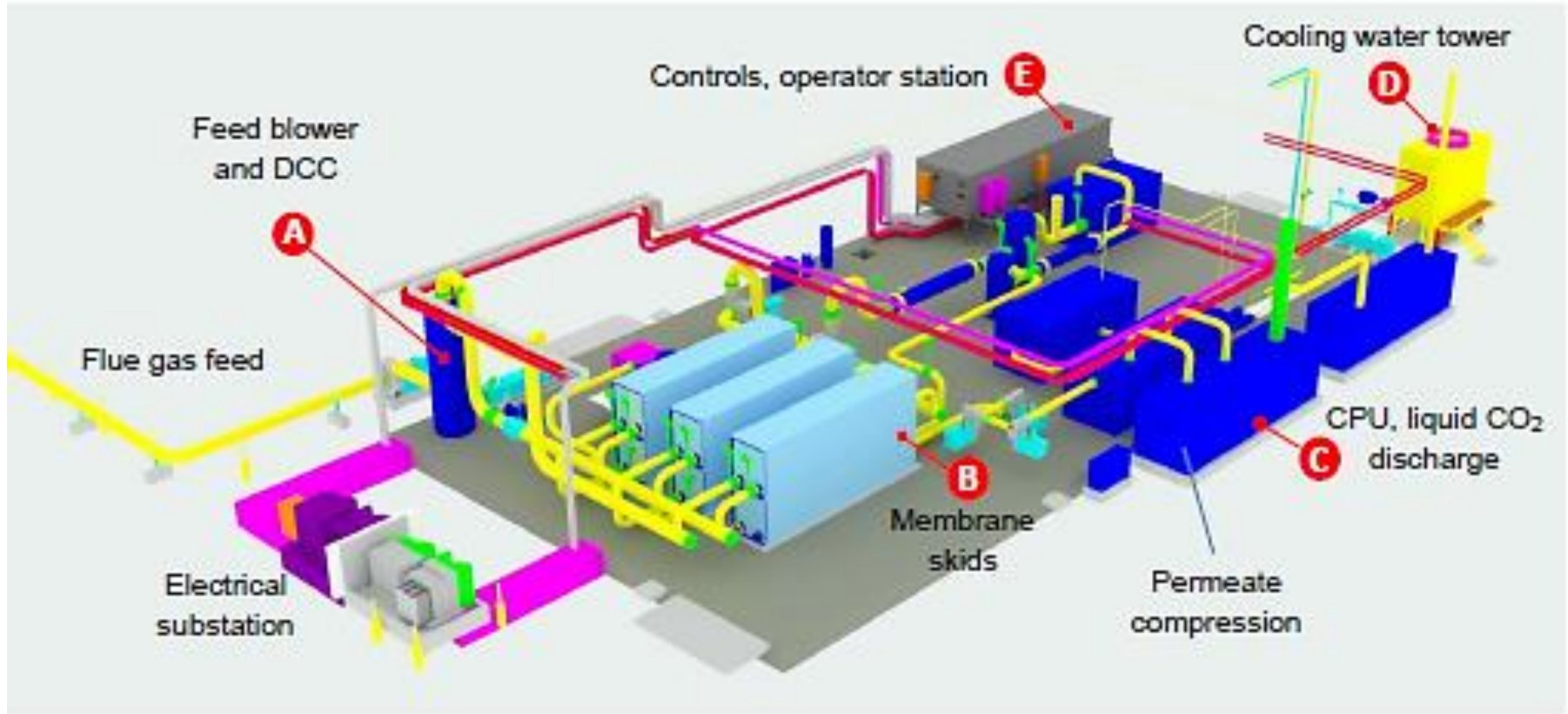
The Phase I Process Flow Diagram



The Phase II Partial Process Flow Diagram (The DCC)



Layout of the Large Pilot System



Large Pilot at DFS



Acknowledgments

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