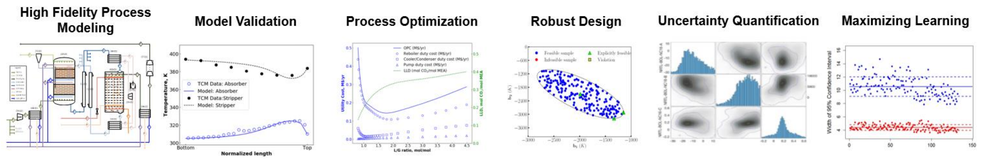
CCSI² Computational Support for Modeling of RTI Non-Aqueous Solvent Technology

Joshua C. Morgan [a], Vijay Gupta [b], Jak Tanthana [b], Marty Lail [b], Abby Nachtsheim [c], Shu Pan [d], Jay Kamichetty [d], Ryan Hughes [a,e], Benjamin Omell [a], Michael Matuszewski [a,e]

[a] National Energy Technology Laboratory, [b] Research Triangle Institute, [c] Los Alamos National Laboratory, [d] SLB, [e] NETL Support Contractor

CCSI² Pilot Support Capabilities

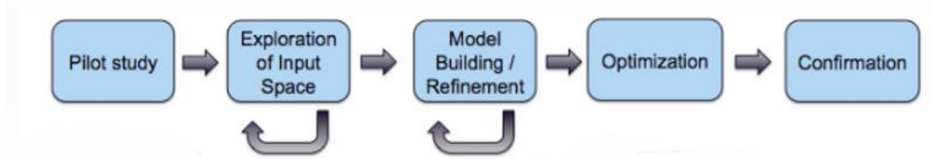
CCSI² partners with developers of novel CO_2 capture systems to accelerate the scale-up and commercialization of the technologies by leveraging its core modeling capabilities:



Design of experiments is a powerful tool for accelerating learning by targeting maximally useful input combinations to match experiment goals

Sequential design of experiments (SDoE) allows for incorporation of information from an experiment as it is being run, by updating selection criteria based on new information

Test campaigns may be designed in phases with varying objectives, tailored to achieve project goals



CCSI² Collaborations with RTI

Research Triangle Institute (RTI) has developed Non-Aqueous Solvent (NAS) technology with projected improvements over baseline MEA system in terms of energy requirement for solvent regeneration.

CCSI² team supported test campaign at Technology Centre Mongstad (TCM) through use of SDoE strategies.

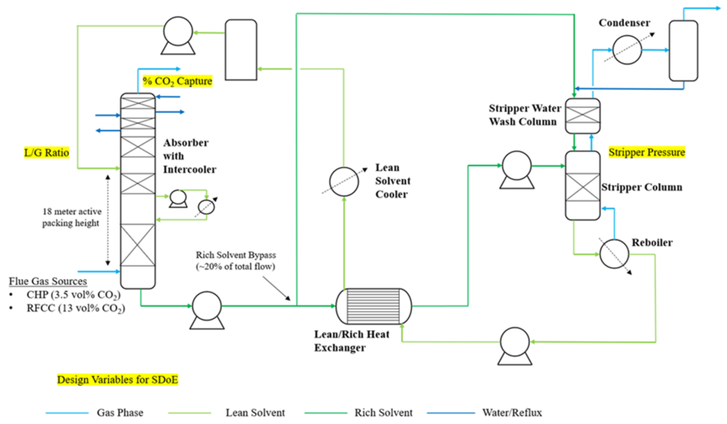
New collaboration between CCSI², RTI, and SLB (which has partnered with RTI to support and accelerate industrialization of NAS system) will focus on process modeling of the next-generation NAS technology (GEN2NAS).

Test Campaign for NAS Technology at TCM

NAS technology tested at TCM (12 MWe scale) – the world's largest facility for evaluation of CO_2 capture technologies

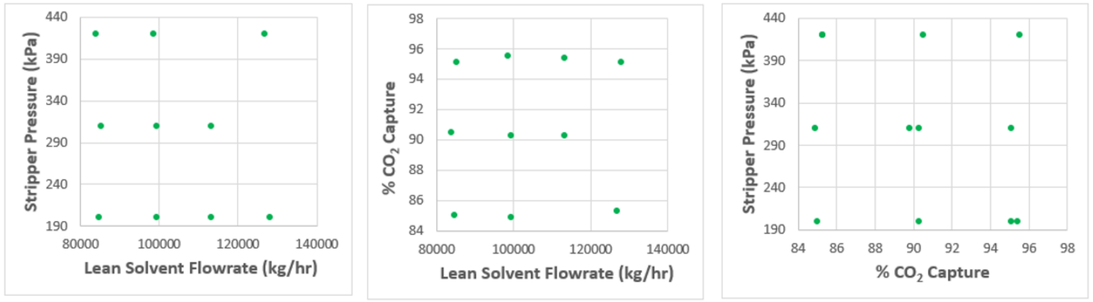
CCSI² team contributed separate designed experiments for gas-fired combined heat and power (CHP) [3.7 vol% CO_2] and residual fluidized catalytic cracker (RFCC) [13.5 vol% CO_2] flue gas sources

Each designed experiment included a series of test matrices with 12-22 proposed operating conditions for flexibility in design size:



Design Factors:
CO_2 Capture: 85-95%
Absorber L/G Ratio: 2.5 – 6.5 kg/kg
Stripper Pressure: 0.9-3.2 barg

Data sets generated for SDoE demonstrate good coverage of operation space:



Contact:
Joshua Morgan, National Energy Technology Laboratory
Joshua.Morgan@netl.doe.gov

Disclaimer: This project was funded by the United States Department of Energy, National Energy Technology Laboratory, in part, through a site support contract. Neither the United States Government nor any agency thereof, nor any of their employees, nor the support contractor, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof. Acknowledgements: The authors graciously acknowledge funding from the U.S. Department of Energy, Office of Fossil Energy and Carbon Management, through the Carbon Capture Program.