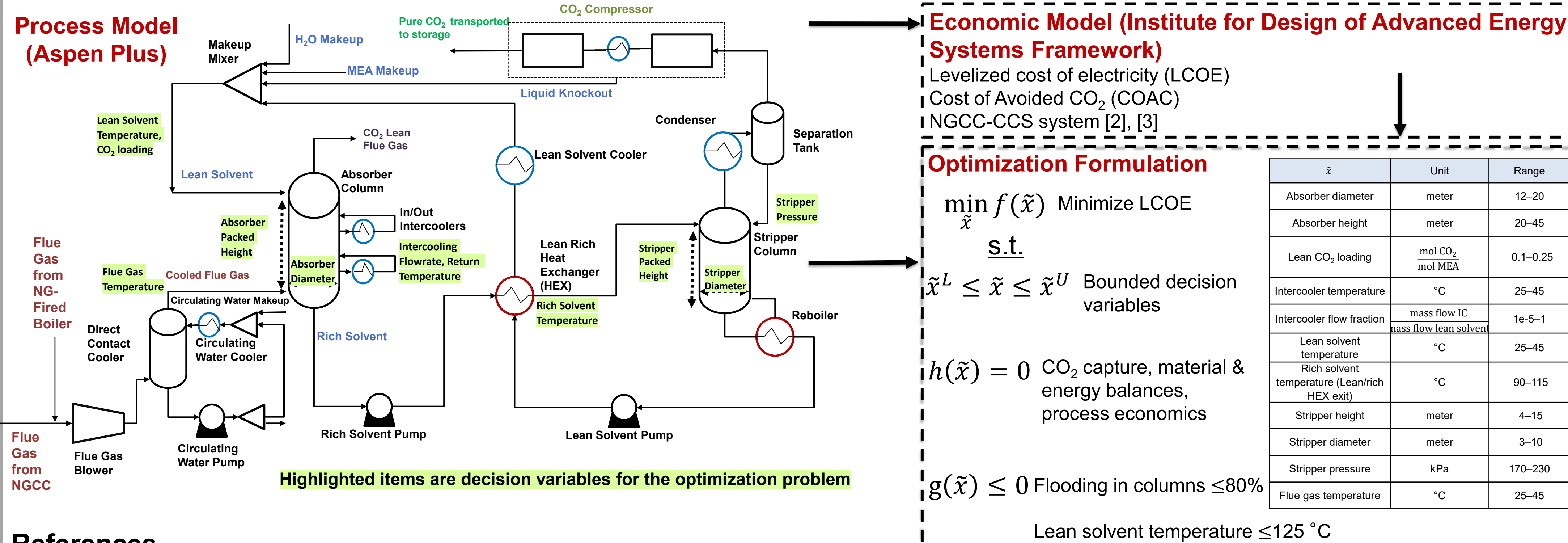


Project Objective

- Determine the economically optimal process design and operating conditions of a monoethanolamine (MEA) solvent-based carbon dioxide (CO₂) capture system
- Set the point source of CO₂ emissions for a commercial-scale natural gas combined cycle (NGCC) power plant (690 MW) with flue gas containing ~4 vol% CO₂
- Perform techno-economic analysis at high CO₂ capture levels
- Study the effect of steam sources (NGCC steam cycle and natural gas auxiliary boiler) on the optimum performance and cost of the NGCC-carbon capture and storage (CCS) system
- Quantify process and model uncertainties for high CO₂ capture in solvent-based systems

Techno-economic Optimization Framework

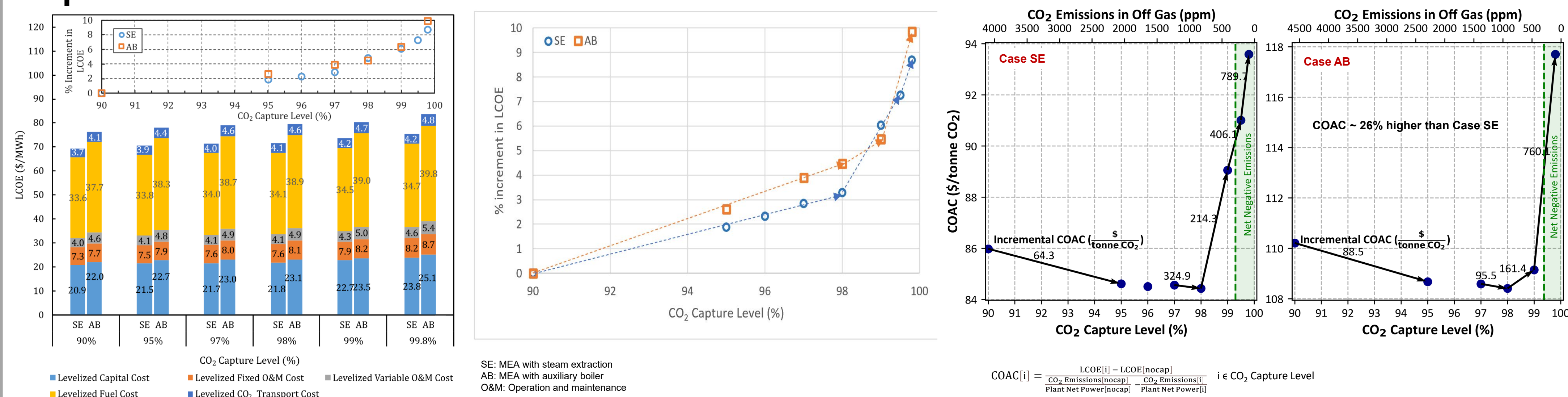
Implemented in FOQUS (Framework for Optimization, Quantification of Uncertainty, and Surrogates) [1]



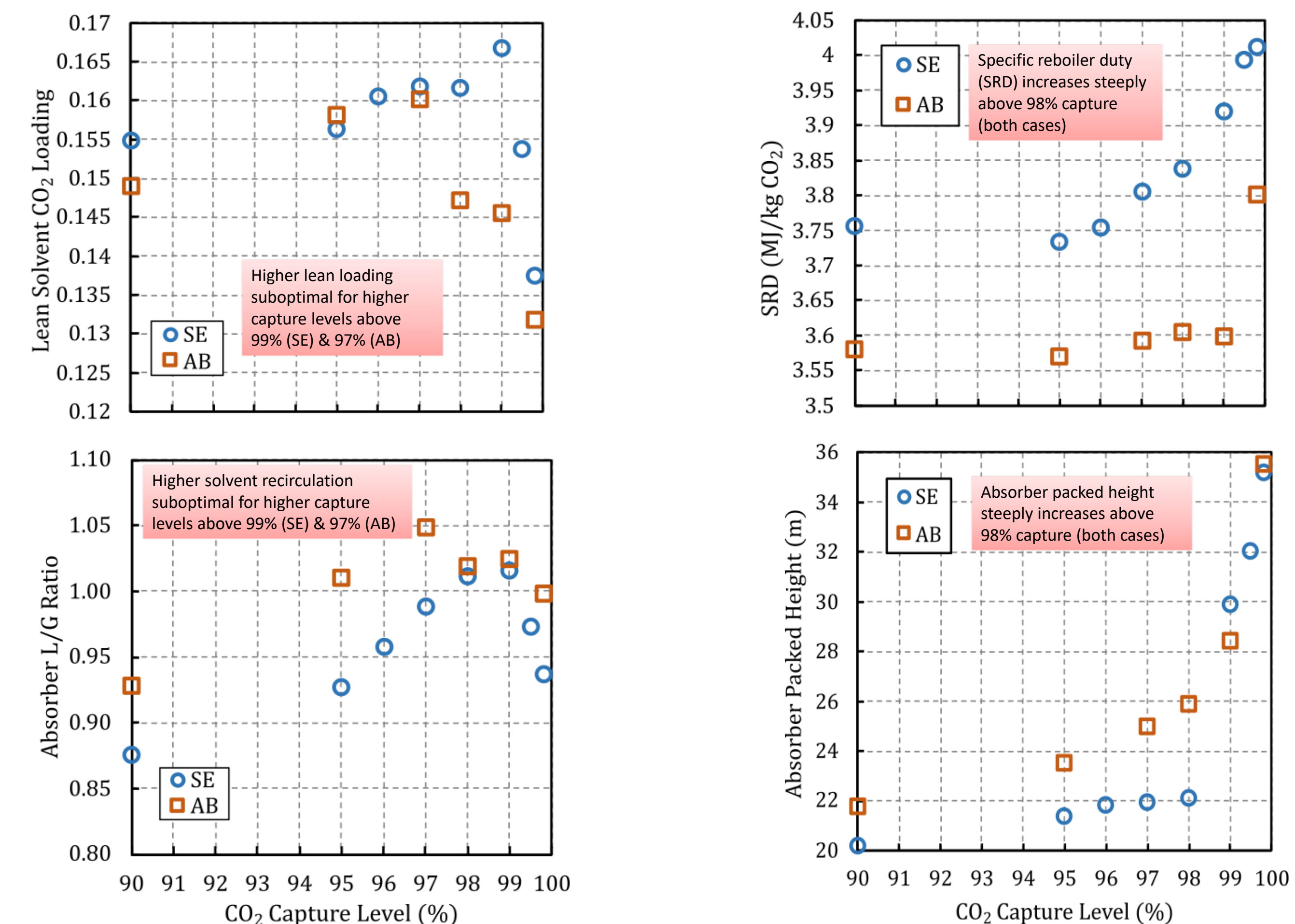
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Optimal LCOE and COAC with Incremental Avoided Cost

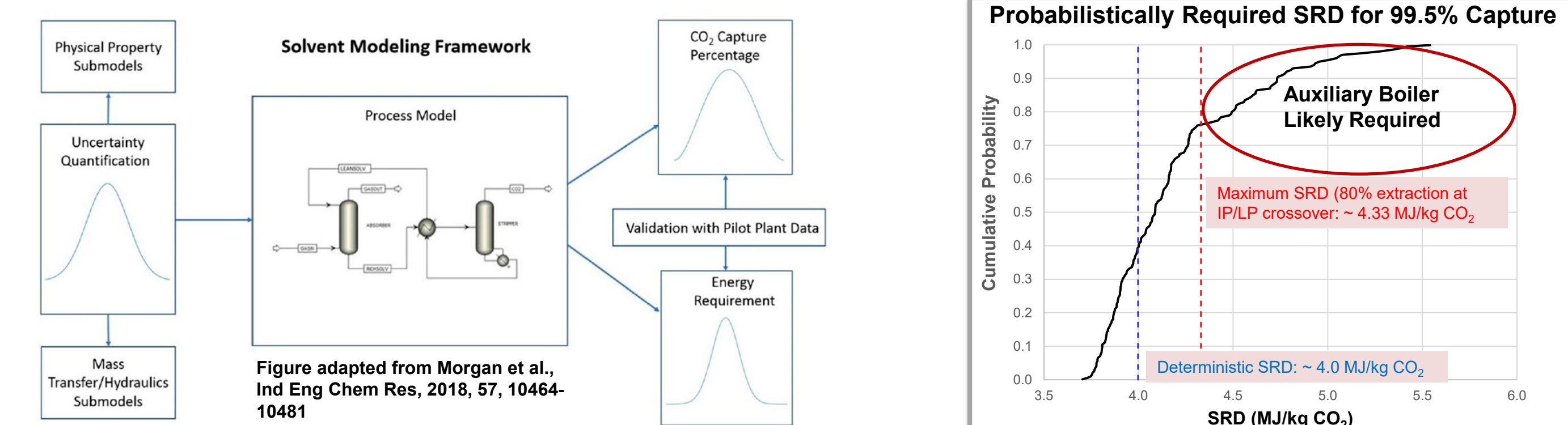


Optimum Design and Operation of the CCS Unit

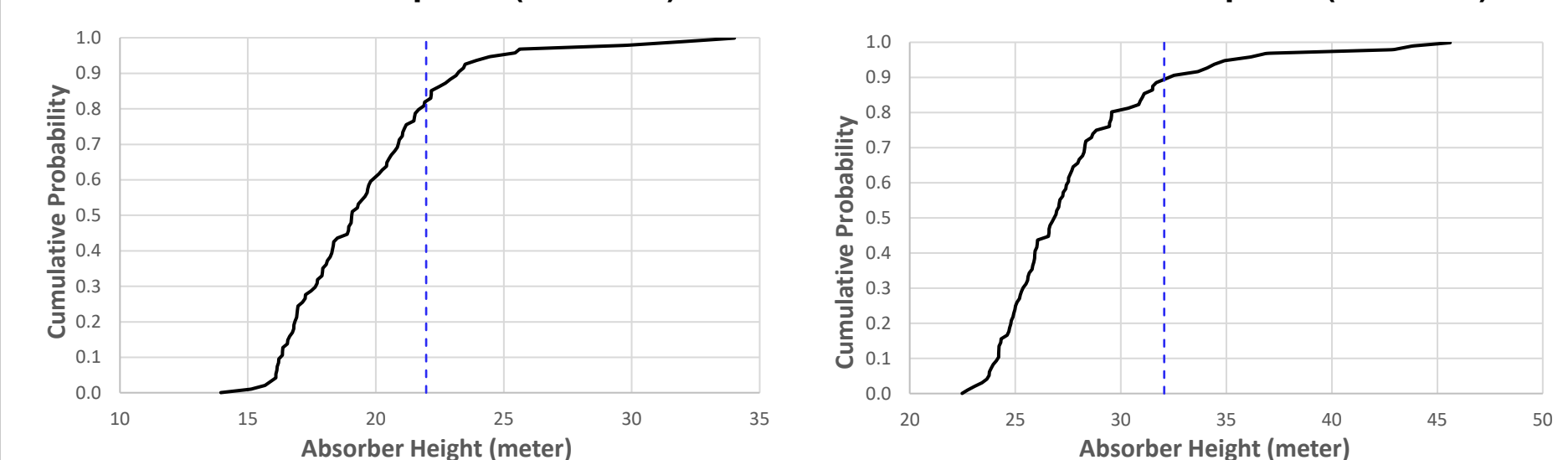


Quantifying Impacts of Uncertainty on High Capture Absorber Height and SRD

Thirteen parameters were considered in the thermodynamic and mass transfer models, selected based on Sobol analysis [4], [5].

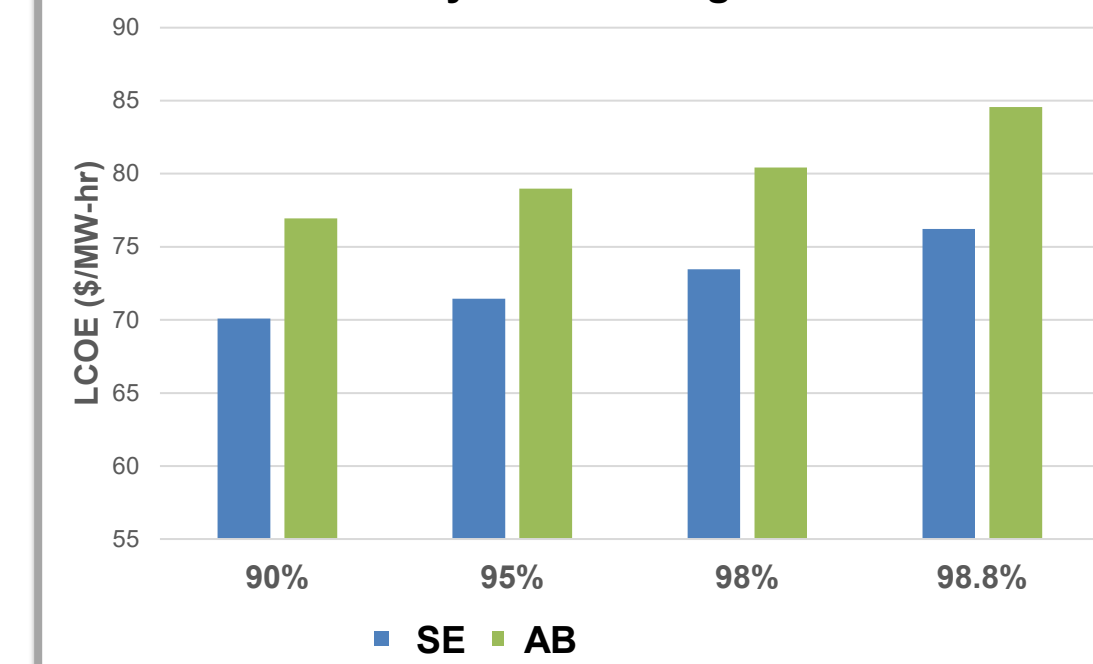


Probabilistically Required Absorber Height to Reach 97% Capture (SE Case)



Blue dash = deterministic case

Auxiliary Boiler Design Cost



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