
Michael Matuszewski

President & Founder

AristoSys, LLC

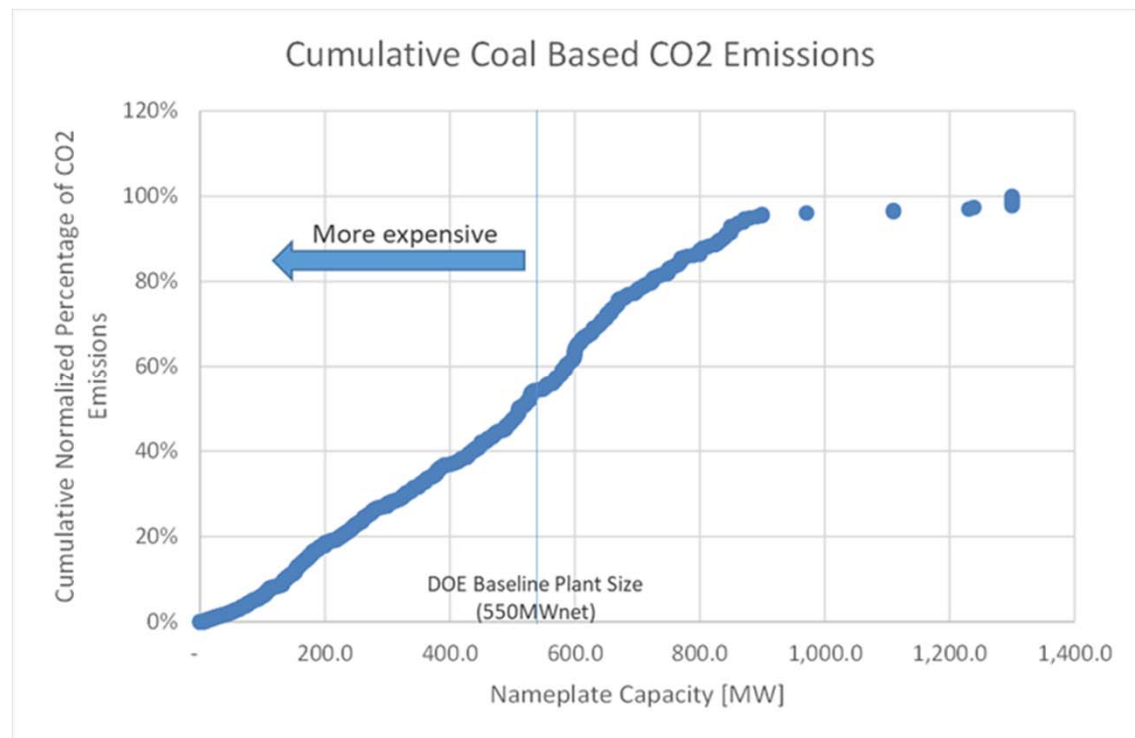
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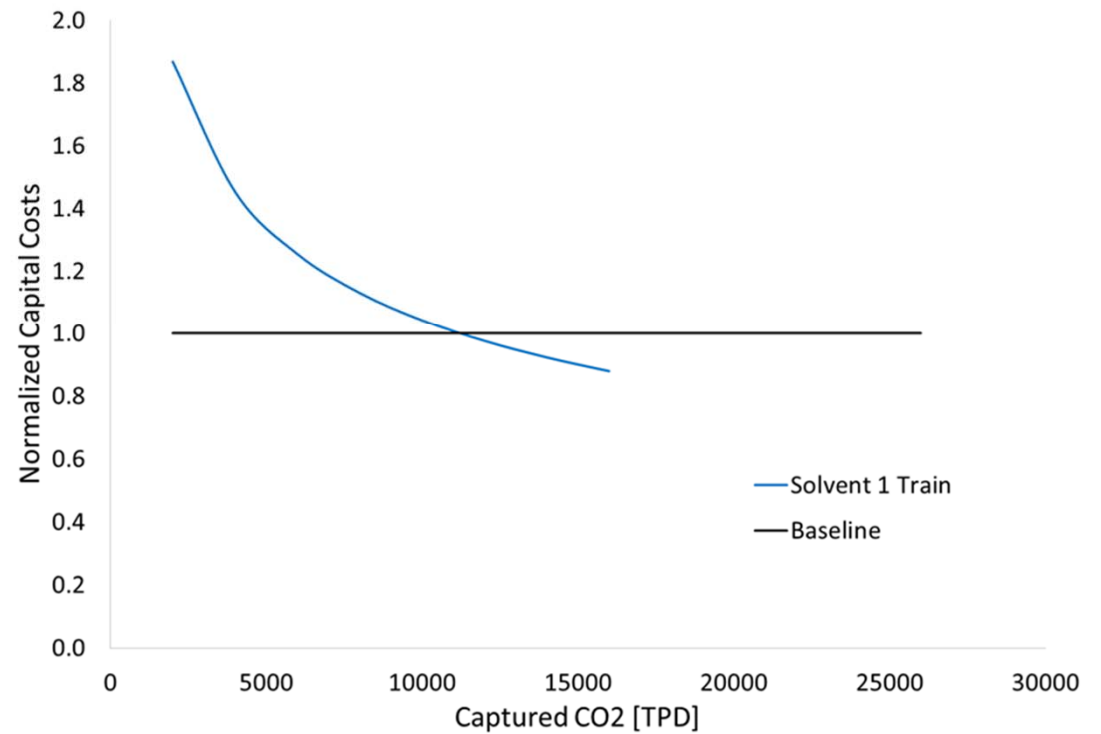
About Me

- Chemical Engineer – Process Systems Engineering
- AristoSys, LLC – Provides R&D Guidance through Advanced Process Simulation & Optimization
- Applications – CO₂ Capture and Utilization, Advanced Fossil Energy Technology, Natural Gas Conversion

Over Half the
Fleet is
*Smaller than
Baseline Size*

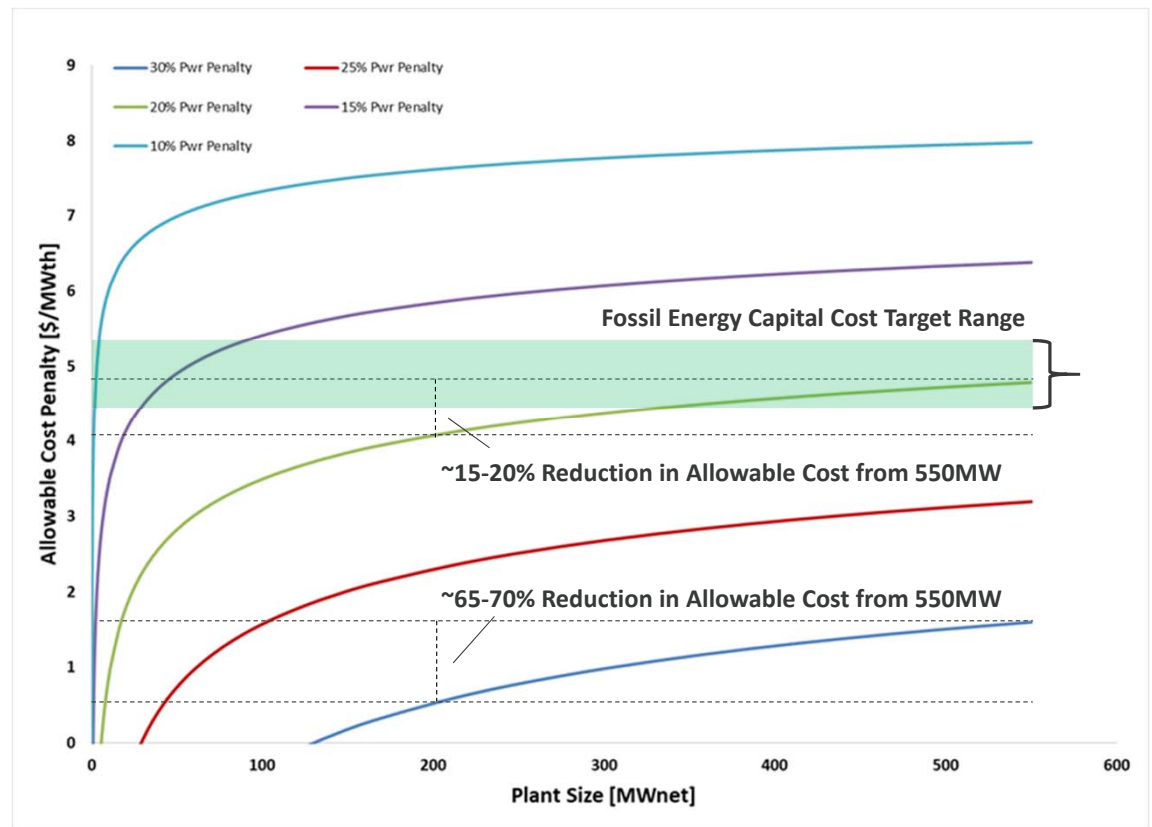


Conventional Manufacturing: “Dis-Economies of Scale”



It's Difficult
to Reach FE
Goals:
*Harder at
Smaller Sizes*

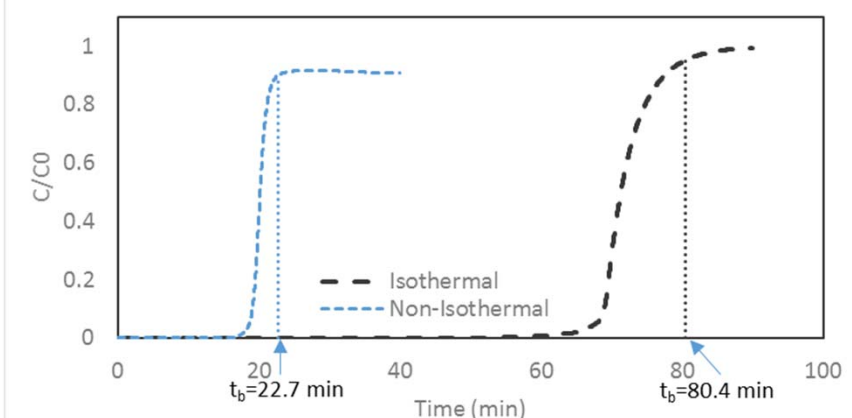
CCS Capital Cost Penalties



Important Work: LBNL CO₂ Sorbent

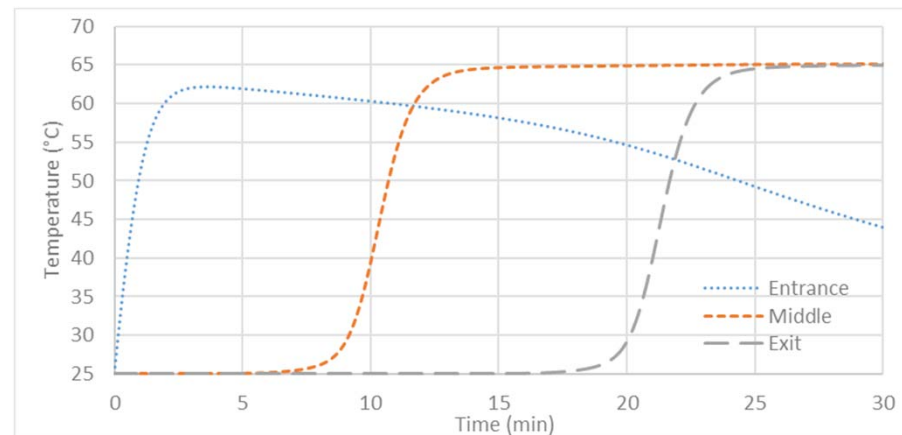
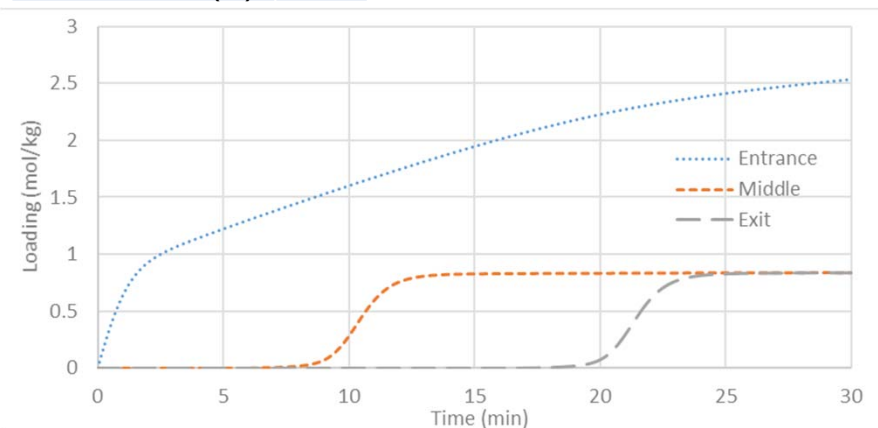
Operating Conditions

Pressure (bar)	1.1
Temperature (°C)	25
Flow rate (mol/s)	120
y_{CO_2}	0.132
$y_{\text{H}_2\text{O}}$	0.055
y_{N_2}	0.813
Bed Length (m)	10
Bed Diameter (m)	3



- Large temperature spikes due to high heat of adsorption and poor heat removal from the system
- Thermal management can considerably increase performance as seen by comparing isothermal with non-isothermal cases for same inlet conditions

- $t_{b, \text{intensified}} = 80.4$ min
- $t_{b, \text{non-intensified}} = 22.7$ min



Important Work: ORNL Packing

- Heat exchanger integrated into packing
- Conceptual system has fluid flowing within fins (12.7 mm cell)
 - Outer jacket has cool fluid on the input
 - Complete flexibility on porting of fluid
 - All aluminum (250 W/m-K thermal conductivity)
- Concept Laser Xline1000 system
- Material: Aluminum (ValimetAM103, 15 to 35 micron aluminum powder)

