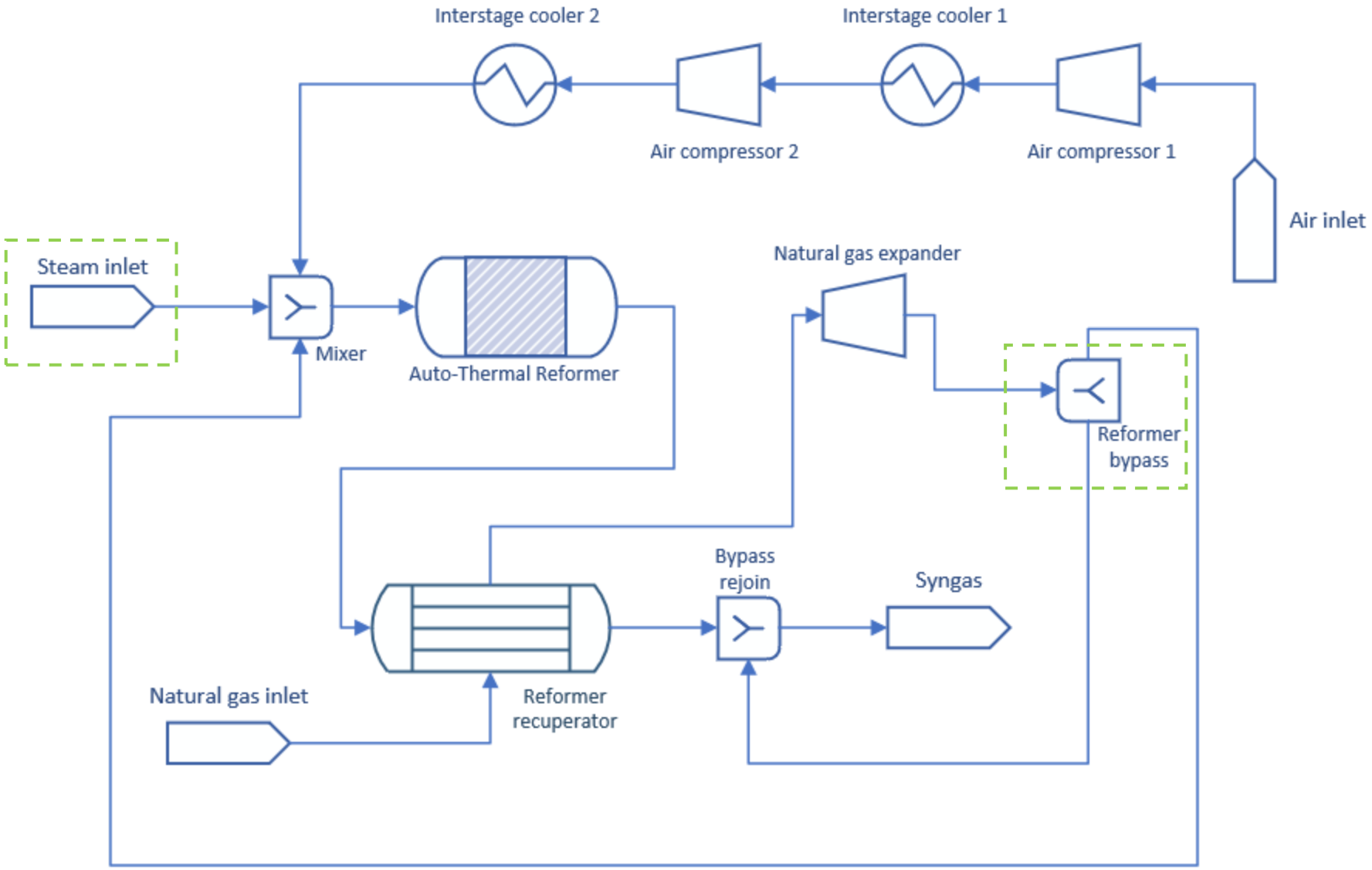
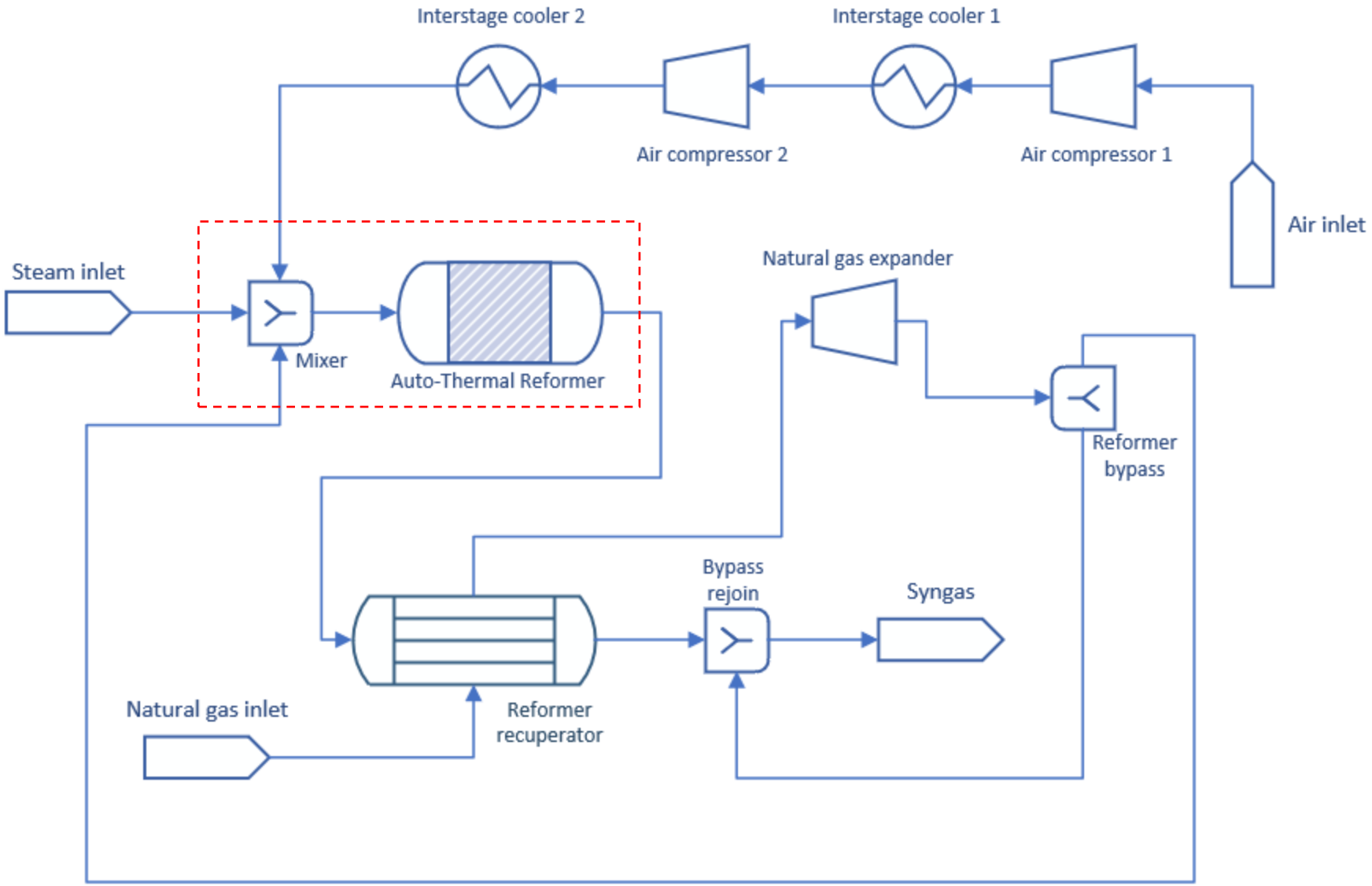
CONVERSION OF 0.94 vs 0.95

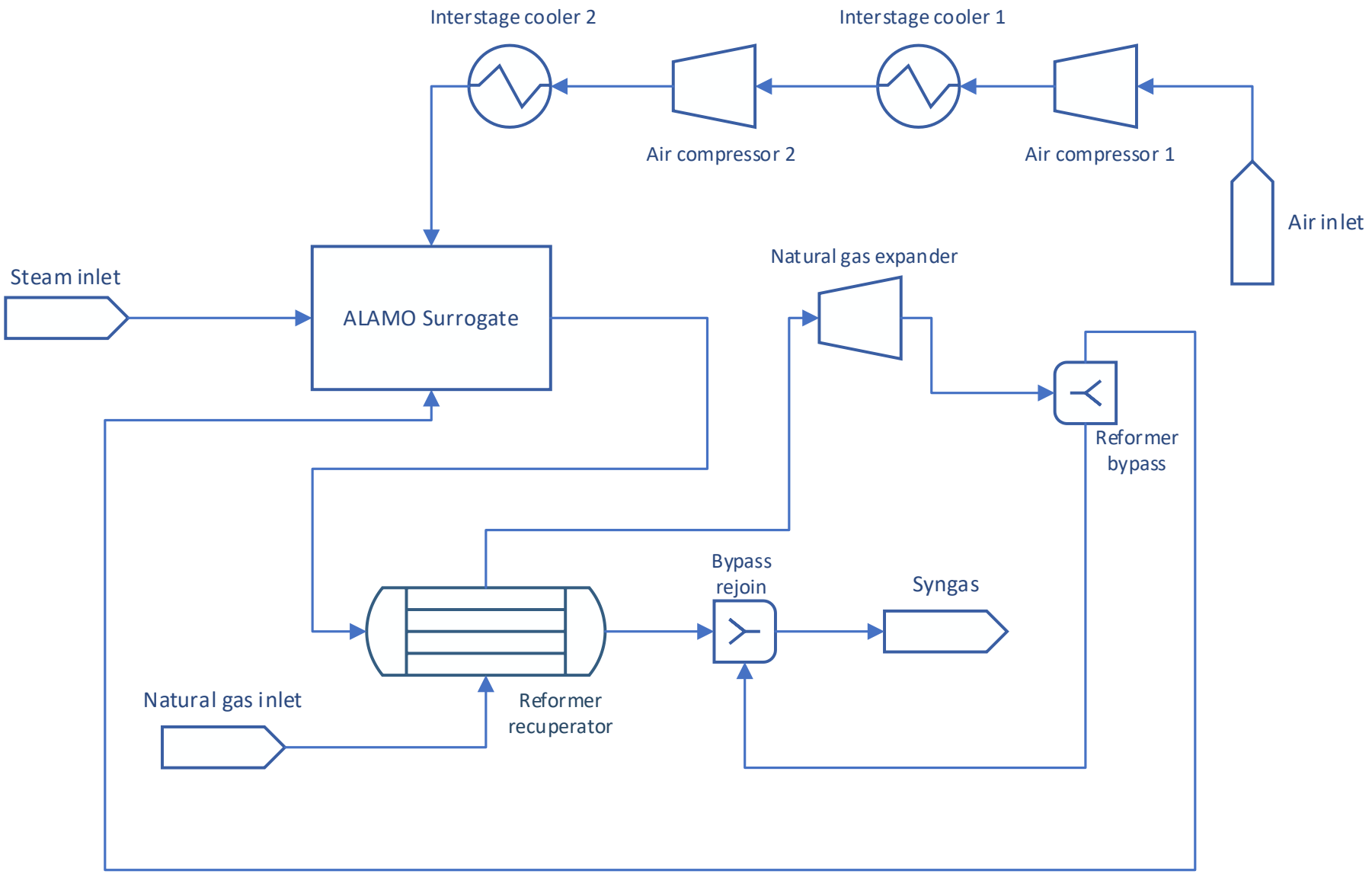
Full Space Flowsheet



ALAMO Flowsheet



ALAMO Flowsheet

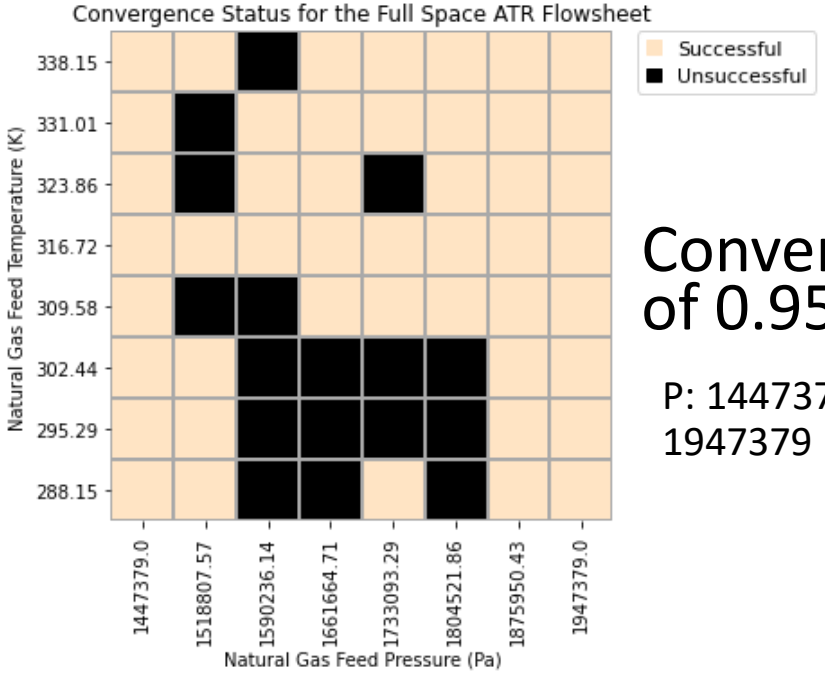


Optimization Problem

Maximize H_2 composition in the product stream such that its minimum flow is 3500 mol/s, its maximum N_2 concentration is 0.3, the maximum reformer outlet temperature is 1200 K, and the maximum product temperature is 650 K.

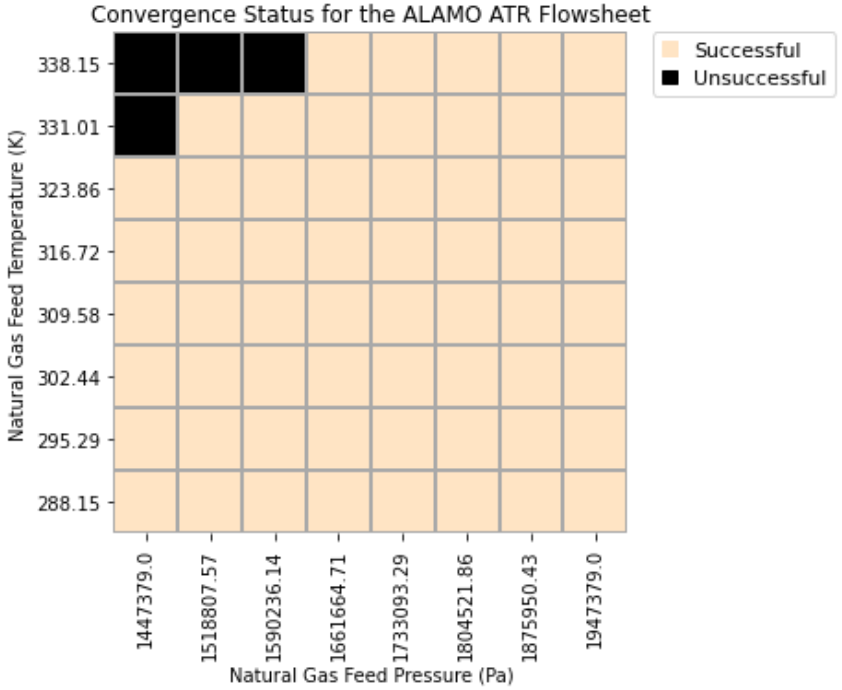
Conversion of 0.95

P: 1447379 to 1947379 Pa



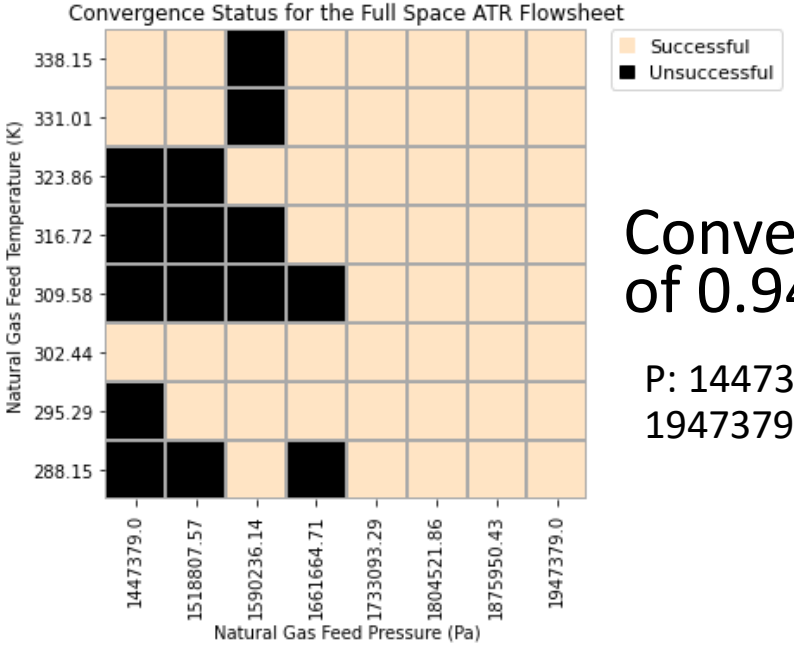
Conversion of 0.95

P: 1447379 to 1947379 Pa



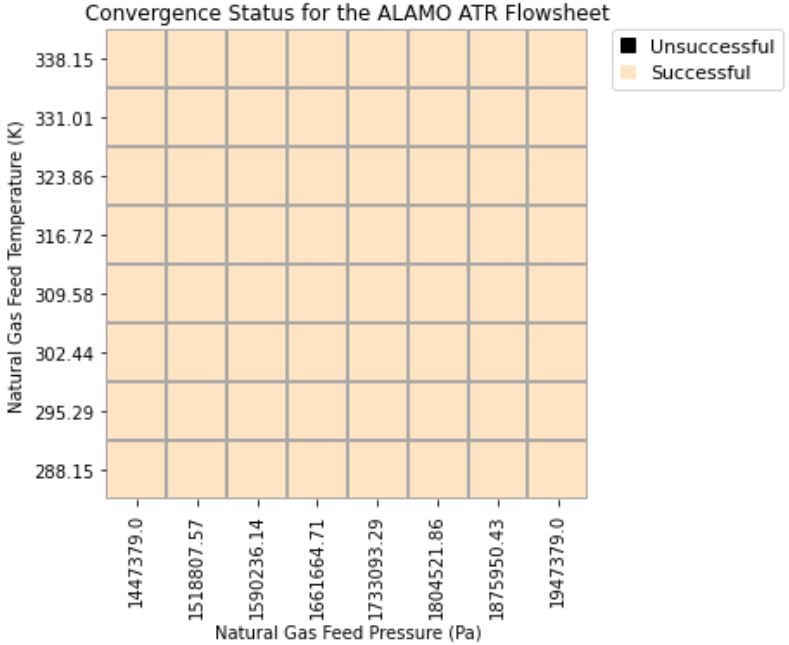
Conversion of 0.94

P: 1447379 to 1947379 Pa



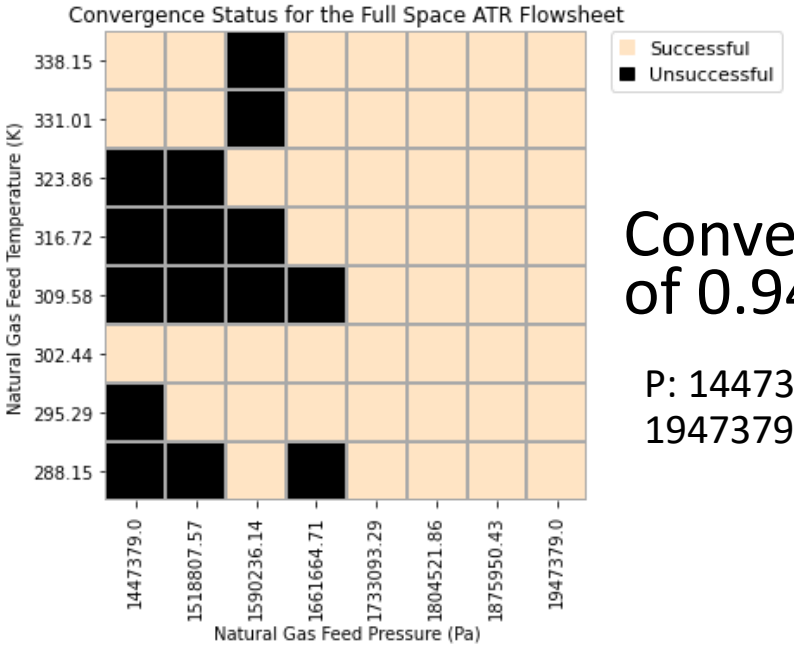
Conversion of 0.94

P: 1447379 to 1947379 Pa



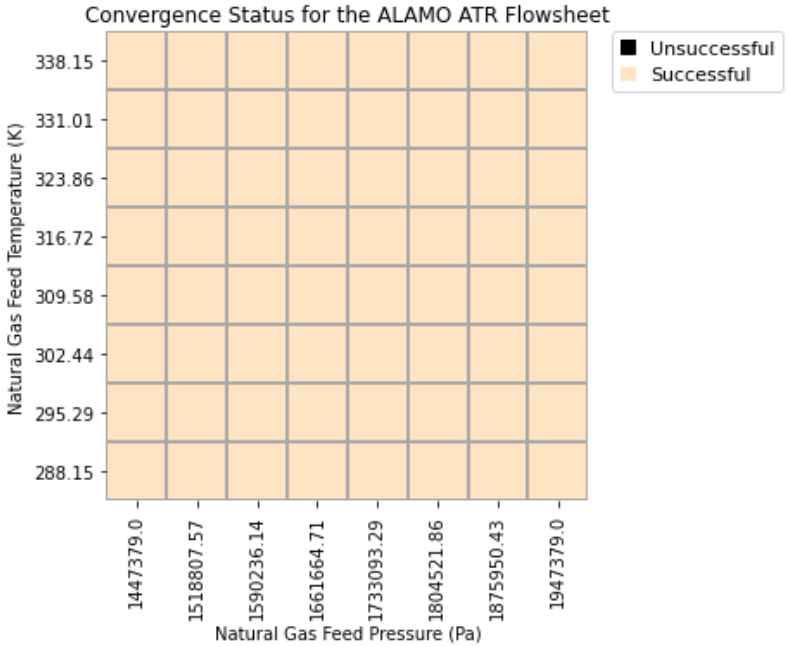
Conversion of 0.94

P: 1447379 to 1947379 Pa



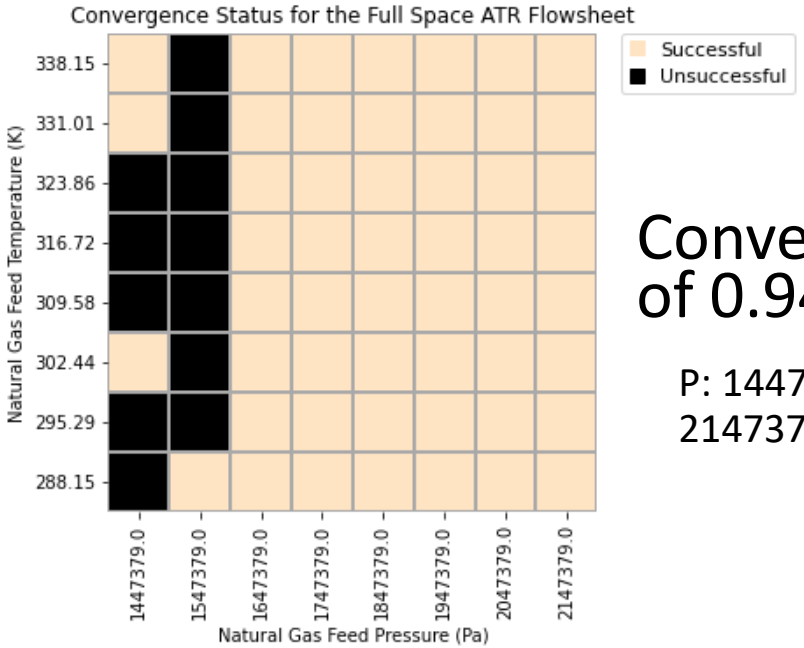
Conversion of 0.94

P: 1447379 to 1947379 Pa



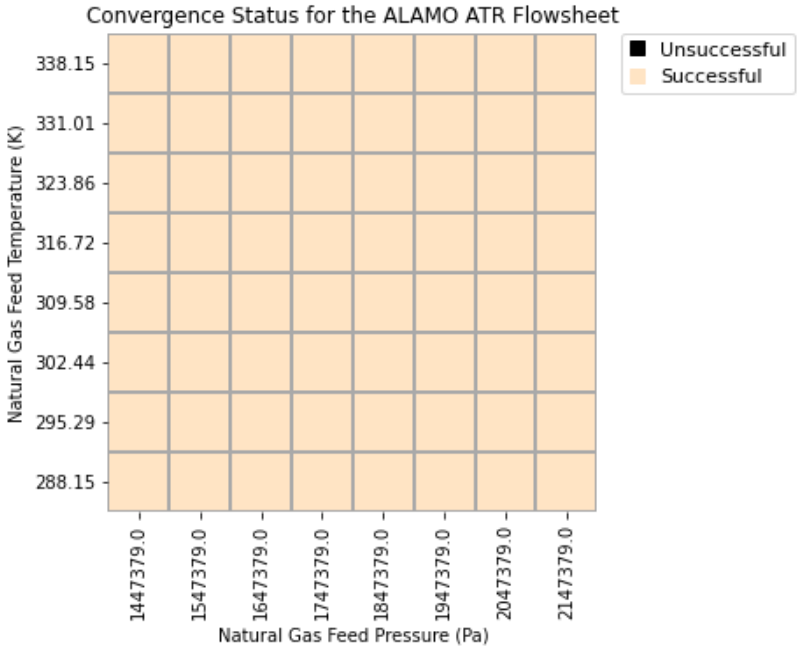
Conversion of 0.94

P: 1447379 to 2147379 Pa

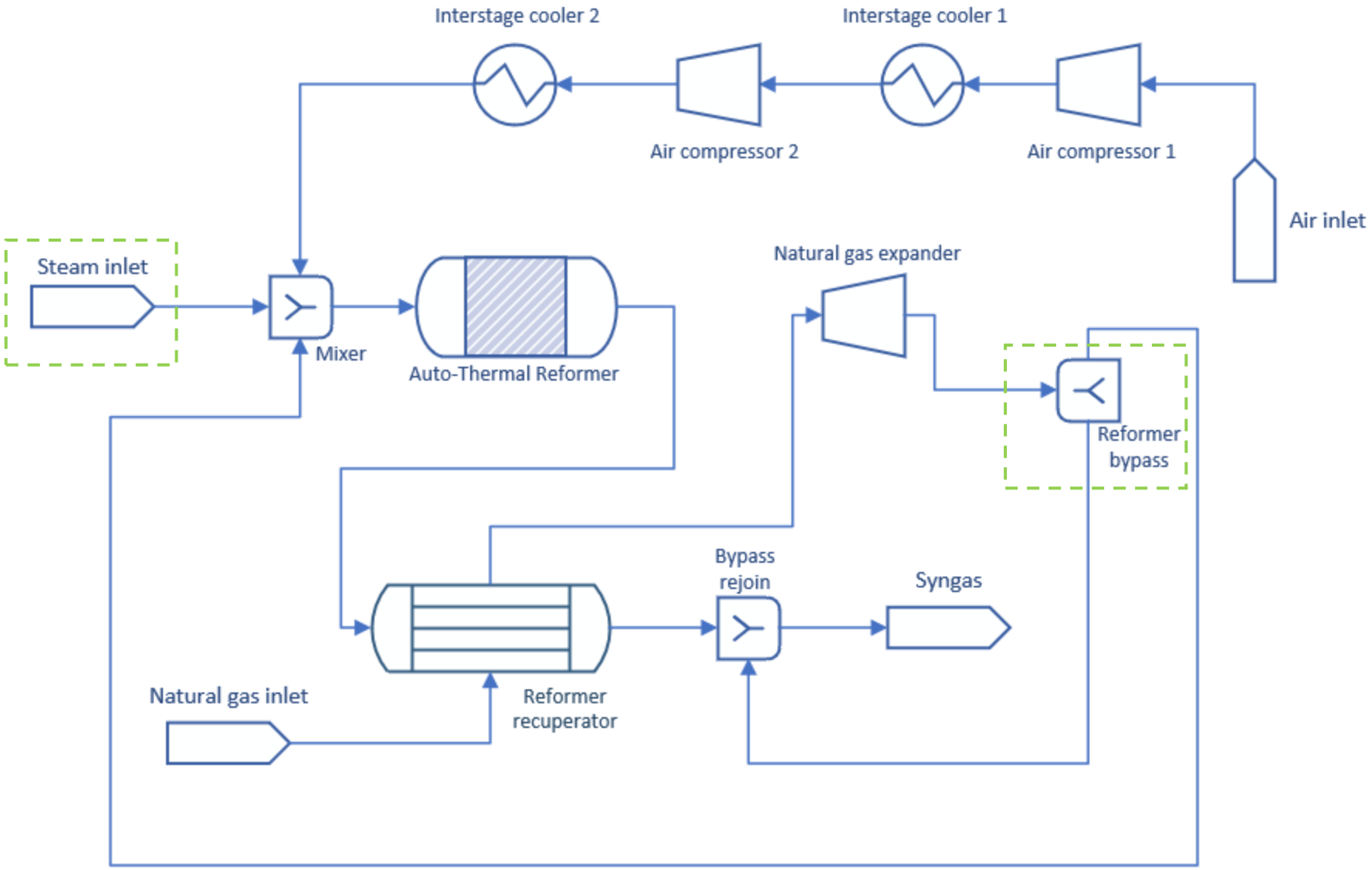


Conversion of 0.94

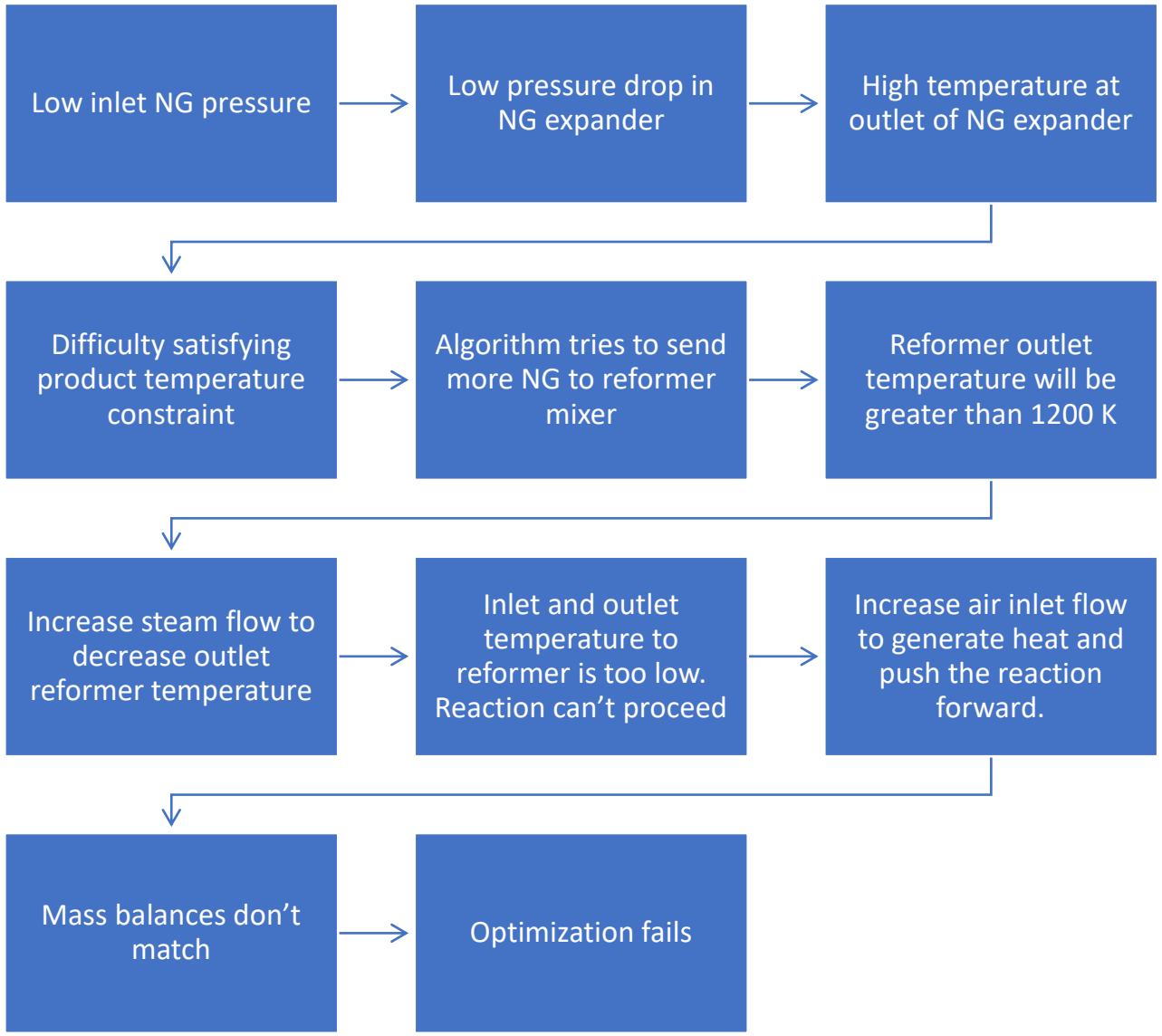
P: 1447379 to 2147379 Pa

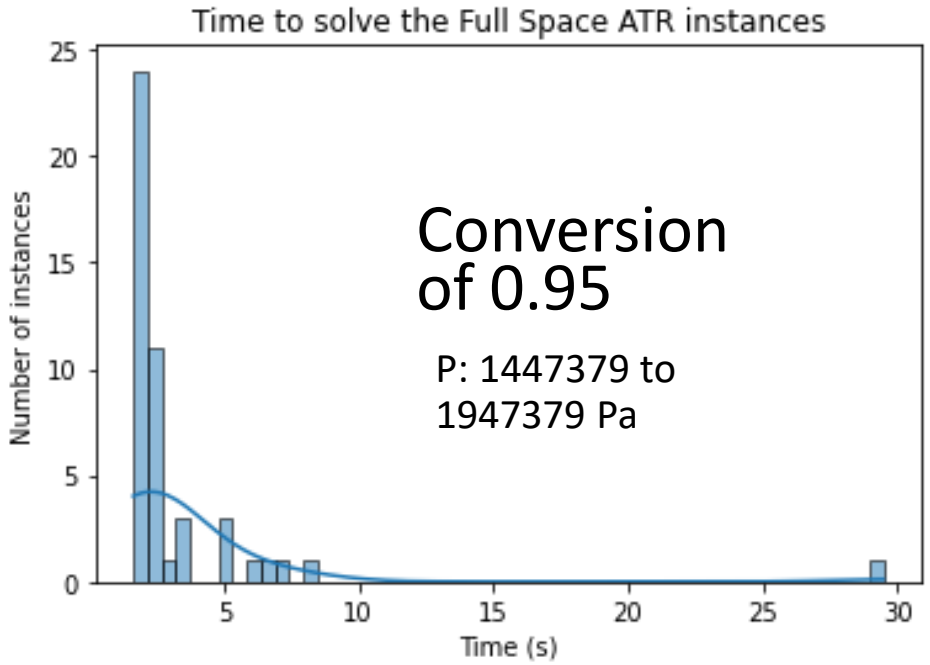


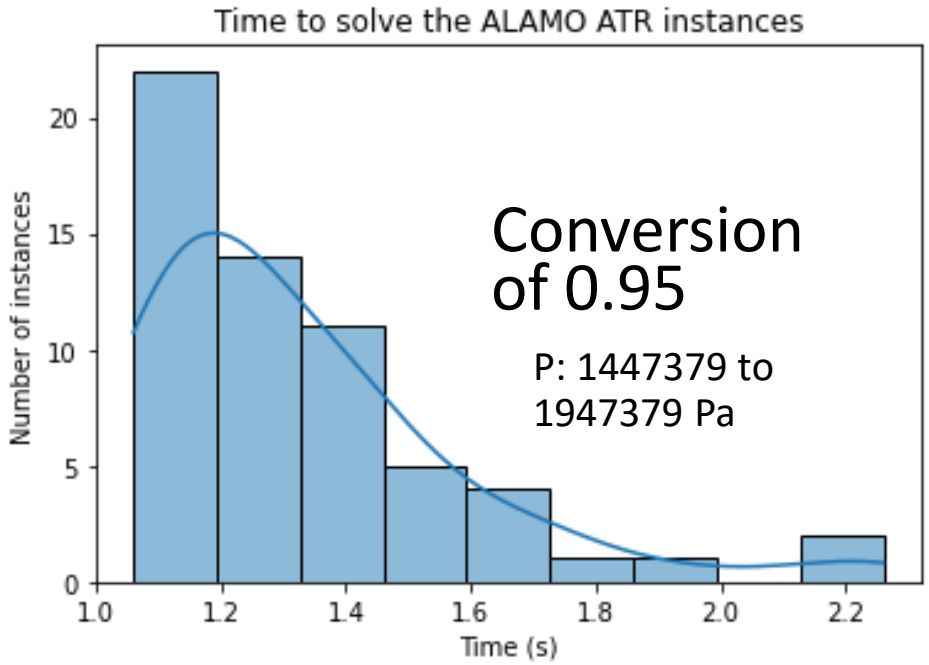
Full Space Flowsheet

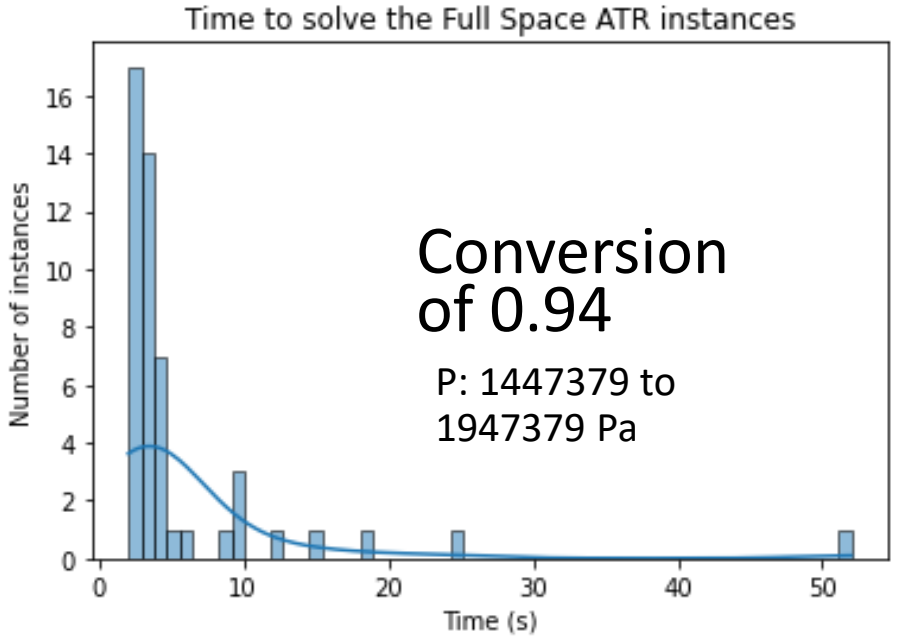


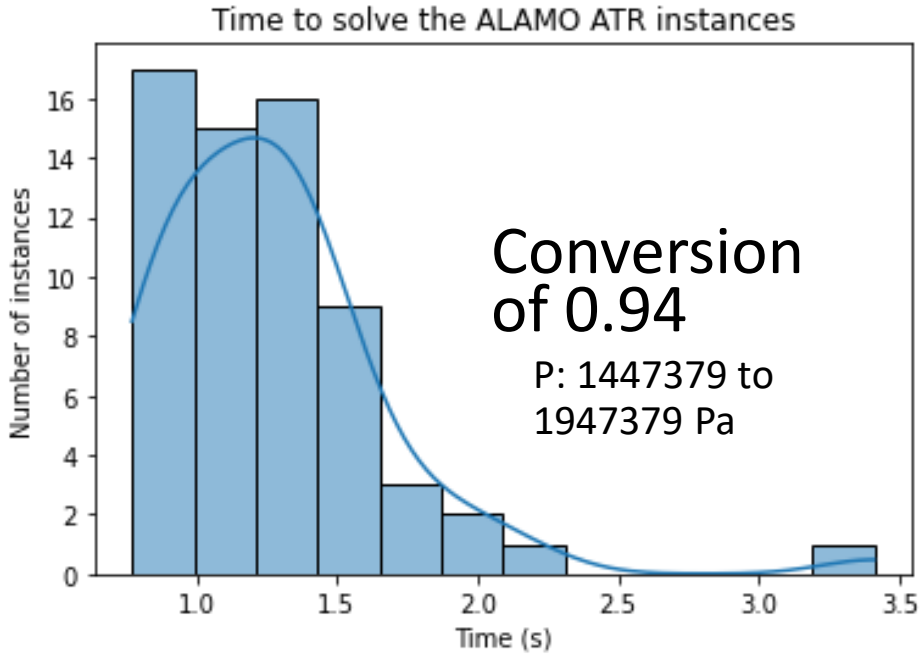
Why the optimization fails at low inlet pressures?



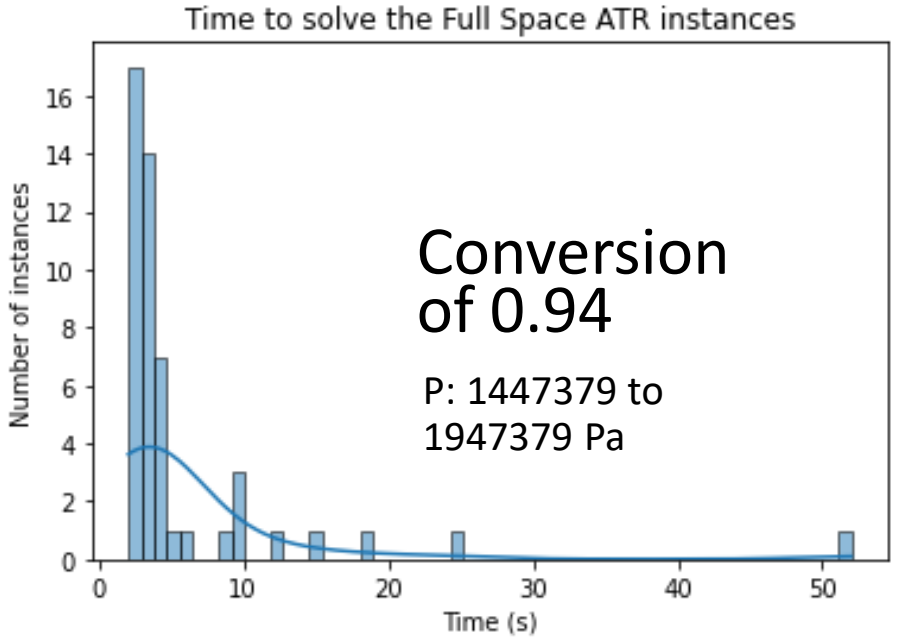


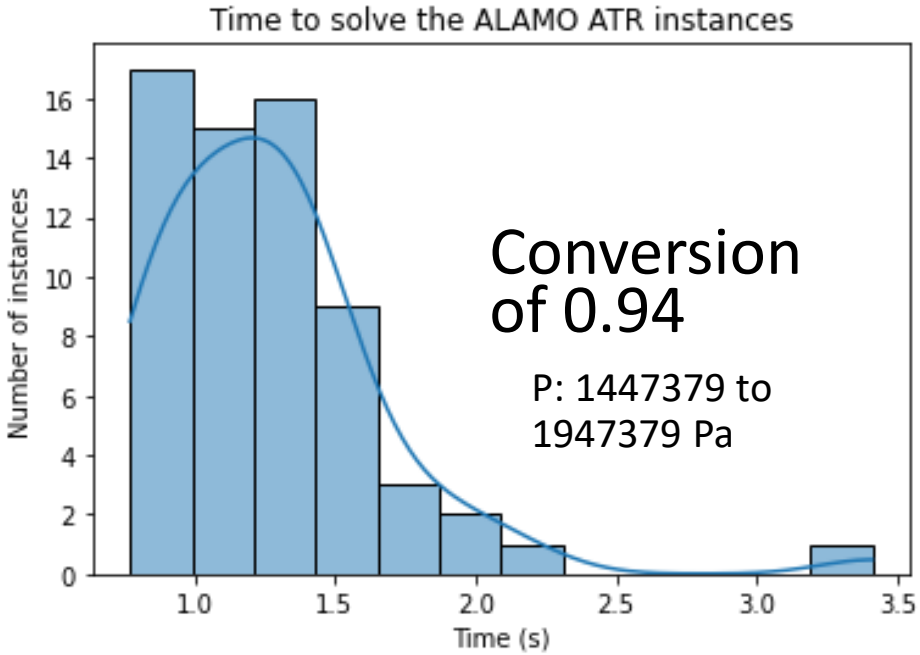


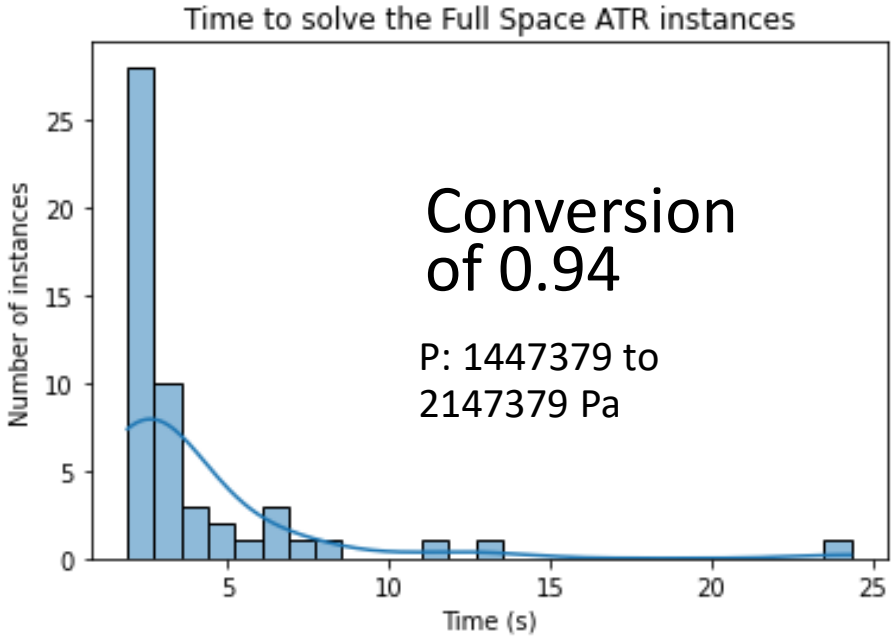


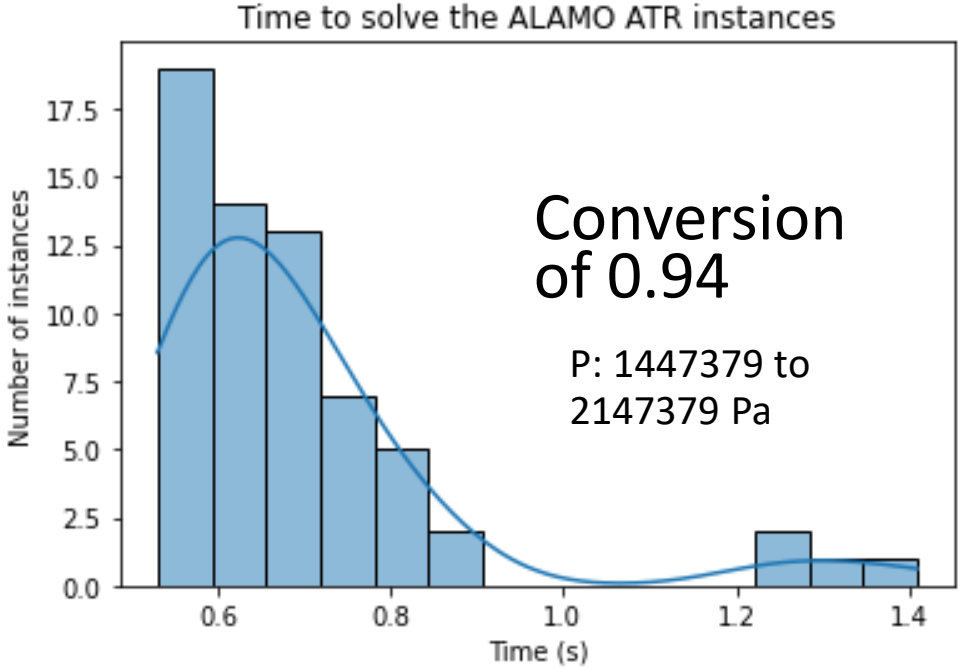


*Only successful runs considered









*Only successful runs considered

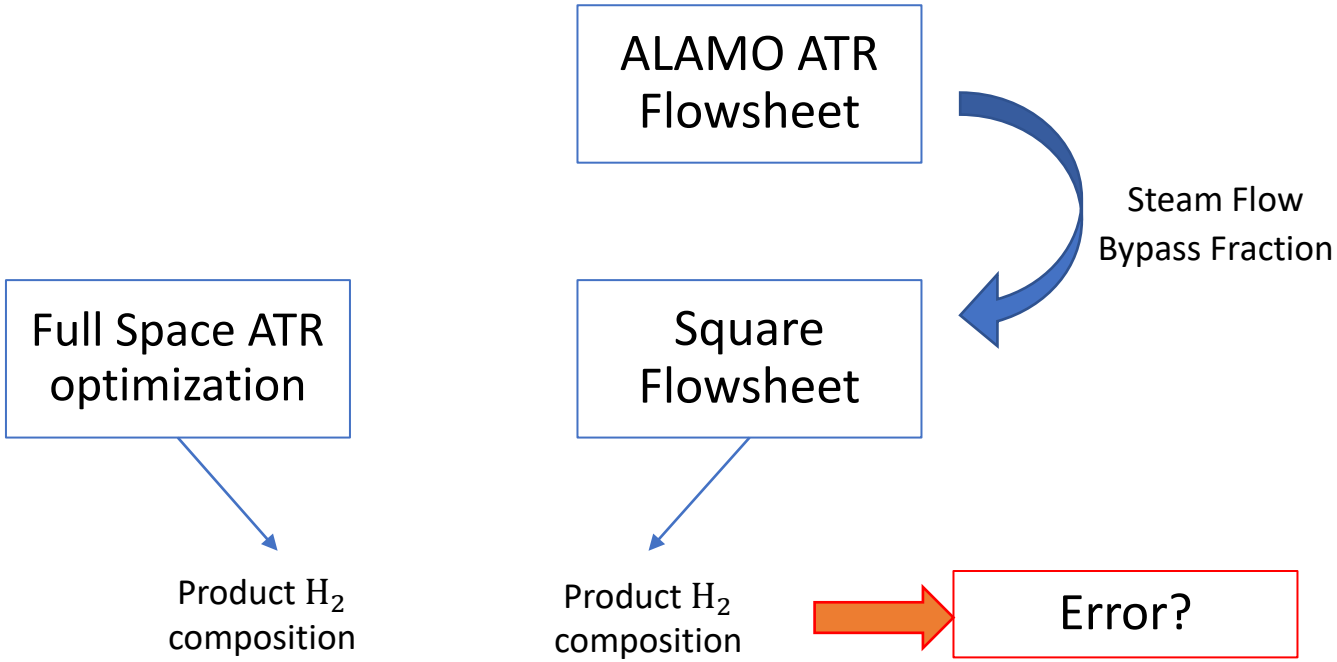
	Objective Value	Steam Flow	Bypass Fraction
Conversion of 0.95 P: 1447379 to 1947379 Pa	Mean error: 2.0 % Standard deviation: 0.7% Min. error: 0.7% Max. error: 3.4%	Mean error: 4.8 % Standard deviation: 2.4% Min. error: 0.1% Max. error: 7.5%	Mean error: 2.9 % Standard deviation: 0.9% Min. error: 1.2% Max. error: 4.5%
Conversion of 0.94 P: 1447379 to 1947379 Pa	Mean error: 1.8 % Standard deviation: 0.7% Min. error: 0.7% Max. error: 3.5%	Mean error: 7.3 % Standard deviation: 0.6% Min. error: 5.5% Max. error: 7.9%	Mean error: 2.7 % Standard deviation: 0.8% Min. error: 1.4% Max. error: 4.7%
Conversion of 0.94 P: 1447379 to 2147379 Pa	Mean error: 1.9 % Standard deviation: 0.7% Min. error: 0.7% Max. error: 3.3%	Mean error: 7.6 % Standard deviation: 0.6% Min. error: 5.5% Max. error: 8.4%	Mean error: 2.5 % Standard deviation: 0.8% Min. error: 1.2% Max. error: 4.7%

*Only successful runs considered

ALAMO ATR Flowsheet Validation

- Compare objective values between:

1. Optimization of Full Space ATR Flowsheet
2. Solution of square system with the degrees of freedom determined by the ALAMO ATR Flowsheet.



Conversion of 0.95

P: 1447379 to 1947379 Pa

Mean error: 1.97 %

Standard deviation: 0.71%

Min. error: 0.73%

Max. error: 3.34%

Conversion of 0.94

P: 1447379 to 1947379 Pa

Mean error: 1.48 %

Standard deviation: 0.51%

Min. error: 0.79%

Max. error: 3.04%

Conversion of 0.94

P: 1447379 to 2147379 Pa

Mean error: 1.57 %

Standard deviation: 0.63%

Min. error: 0.68%

Max. error: 3.48%

*Only successful runs considered