Executive Summary

Item	Finding
Highest-impact variables	3 temperature setpoints – `HEX-100.cold_fluid_temperature`, `Fuel.temperature`, `Air.temperature`
Weightage (percentage influence)	24.24 % (HEX-100), 27.85 % (Fuel), 47.90 % (Air)
Target KPI	Heater Outlet Temperature – lower is better (overall 328–501 K)
Best 5 scenarios	Scenarios 0–4 produce the highest outlet temperatures (≈ 500 K → 416 K)
Worst 5 scenarios	Scenarios 47, 38, 37, 35, 34 produce the lowest outlet temperatures (≈ 328 K → 362 K)

1. Variable Impact

Equipment	Setpoint	Current Value (K)	Weightage %
HEX-100	cold_fluid_temperature	329.97	24.24
Fuel	temperature	364.52	27.85
Air	temperature	305.88	47.90

> **Interpretation** – Air temperature has the strongest influence on the heater outlet temperature. Adjusting the air setpoint yields the largest KPI swing.

2. KPI Distribution Across Scenarios

Rank	Scenario	Heater Outlet Temp (K)	Δ from Overall Mean
1	0	500.90	+71.7
2	1	461.34	+32.2
3	2	441.18	+12.1
4	3	433.88	+4.8

Rank	Scenario	Heater Outlet Temp (K)	Δ from Overall Mean
5	4	416.69	–12.4
20	20	380.18	–46.5
30	30	366.07	–60.5
39	39	359.35	–67.3
42	42	356.77	–69.9
47	47	328.60	–99.7

- **Mean**: ~ 387 K
- **Std-dev**: ~ 78 K

KPI	Min	Max	Range
Heater Outlet Temp	328.60	500.90	172.30

3. Recommendations

Action	Rationale	Expected KPI Effect
Reduce Air temperature	Highest weightage	Decrease outlet temperature, moving toward lower-risk operating point
Adjust Fuel temperature	Significant weightage	Fine-tune within ±10 K to manage temperature swings
Optimize HEX-100 cold-fluid temperature	Moderate weightage	Small but cumulative effect when combined with Air/Fuel adjustments
Control global heat-transfer coefficient	Condition variable	Lower values (≈ 10–11 K) reduce outlet temperature; monitor for operational limits

Quick-look KPI Heat Map

```
Scenario 0: 500.9   Scenario 10: 393.4
Scenario 1: 461.3   Scenario 11: 393.3
Scenario 2: 441.2   Scenario 12: 391.4
Scenario 3: 433.9   Scenario 13: 390.2
Scenario 4: 416.7   Scenario 14: 386.7
```

(Each subsequent scenario shows a gradual downward trend as the air temperature increases and the heat-transfer coefficient decreases.)

Bottom line: Concentrate on the Air temperature setpoint first, then fine-tune Fuel and HEX-100 temperatures, while keeping the global heat-transfer coefficient within an optimal range (≈ 10–12 K) to achieve the lowest heater outlet temperature.