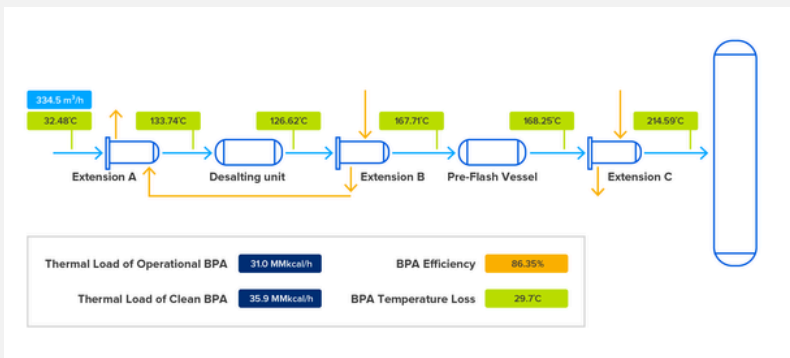


**BEST PRACTICE SERIES**

# Real time heat exchanger train management and cleaning optimization

Real time heat exchanger preheat train management and cleaning optimization tool is a system that estimates, in real time, the efficiency of preheat trains, as well as fouling dynamics for heat exchangers, and uses this information to provide inputs for Engineering / Operation make their decisions on when to clean a heat exchanger. Downstream (Distillation / FCC / Coking preheat trains) and upstream (oil heating / water cooling systems) assets have been using this solution. The first application was built in 2005. Today we have more than 30 systems covered. It takes around 3-6 months to implement one application.

## Gas plant process flow diagram



### ☆ Benefits

- Once estimated that fouling on Petrobras' distillation preheat trains was responsible for a loss of around 8% of the total energy that could be recovered on those systems.
- The above mentioned loss of energy had to be overcome by furnaces, leading to more CO2 emissions (around 185 thousands tonnes/year) and Natural Gas consumption (around 67 thousands tonnes/year)
- **Cost/Time savings:** Using existing infrastructure and free process software

### ⚙ Implementation

- Identifying available measurement and its quality
- Organizing information (PI&Ds, Heat Exchanger datasheets, streams characterization)
- Modelling heat exchangers network
- Structuring panels

### ✓ Key Learnings

- Highly automated monitoring system enables focus on actions to reduce gas consumption and associated emissions
- Dashboards for real-time performance checks created an interface for diagnostics and recommendations between specialist and operations
- Field instrumentation can be a limiting factor
- AI can enhance more complex diagnostics and prognostics (under development)

#### Additional Resources:

- [The cost to implement the tool is related manly to internal human resource and commercial program licensing](#)