OCTOBER 25, 2023

Leveraging AVEVA™ PI System™ Towards Minimizing Flaring

PRefChem

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Agenda

- PRefChem at a Glance
- Aiming for Net Zero Carbon Emission
- Biggest Pain Points for Flaring Identification
- Gain Insight Through Data Transformation
- Drive Optimization and Data Reliability

PRefChem at a Glance

Corporate Structure

PETRONAS

aramco

PRefChem

PRefChem Refining

Pengerang Refining Company Sdn Bhd

PRefChem Petrochemical

Pengerang Petrochemical Company Sdn Bhd

Plant Highlight

300,000 BPSD of crude processing

3.4 million tonnes per annum of Ethylene, Propylene, Butadiene and MTBE

2.5 million tonnes per annum of petrochemical products

Pengerang, Johor, Malaysia

1.3589296604702257, 104.17053666900436

PRefChem PI System Overview

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>430k
PI Tags

~ 264k
Data Source Tags

~ 75k
PI Analyses

PI AF

- Compensation Calculation
- Event Frame Generation
- Asset Roll Up Calculation

PI Vision

- Daily Plant Monitoring
- Critical Operating Parameter Dashboard
- Energy & Utilities Monitoring Dashboard

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Aiming for Net Zero Carbon Emission

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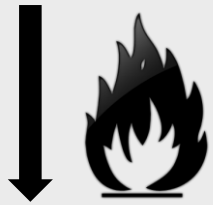
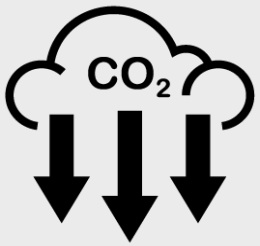
Abatement Levers

- Flare Minimization
- Renewable Energy
- Offsetting
- Energy Efficiencies
- Carbon Capture & Storage (CCS)





Comprehensive flare source monitoring using the right monitoring tool is required for flare minimization.

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Biggest Pain Points for Flaring Identification

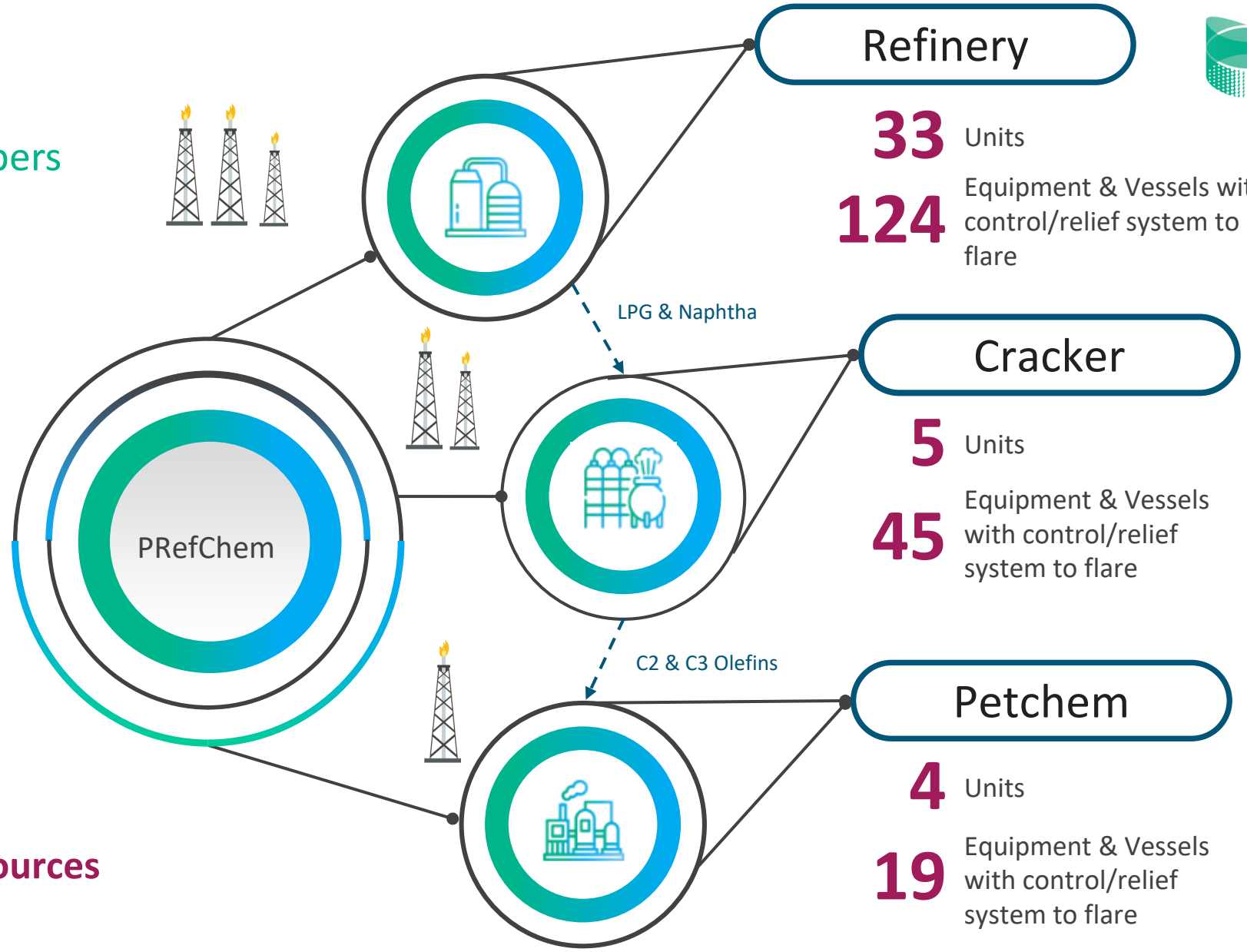
The plant is huge and has complex configuration. How can I quickly find the flare source?

Do we have flowmeter at each flare source?

How can I ensure the flowmeter reading is correct?

Challenge #1

Overwhelming numbers



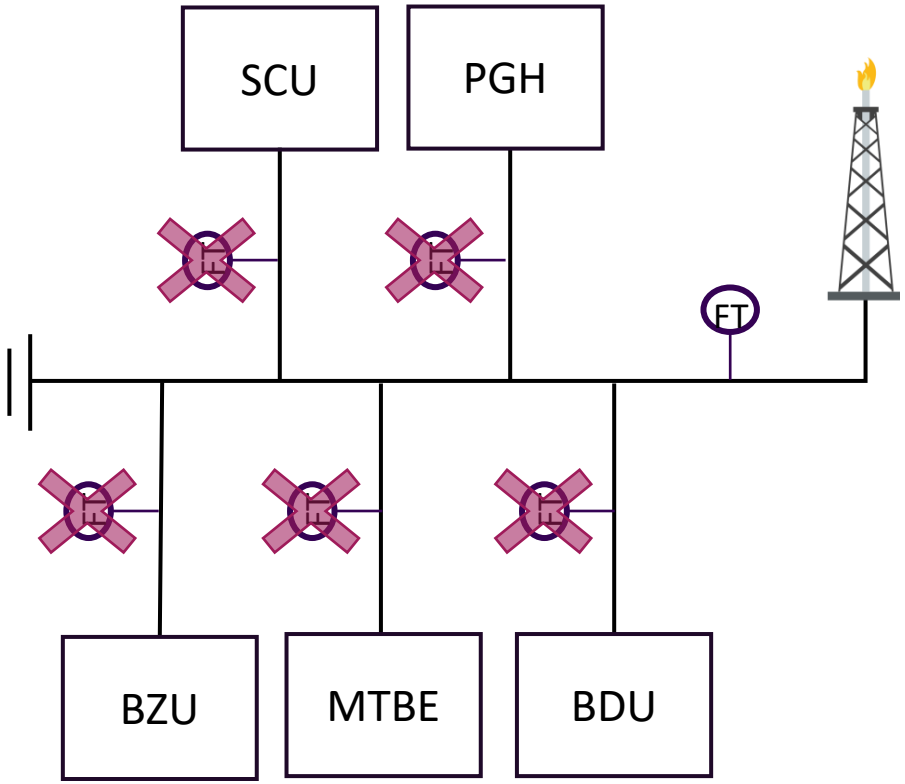
Total of

42 Units

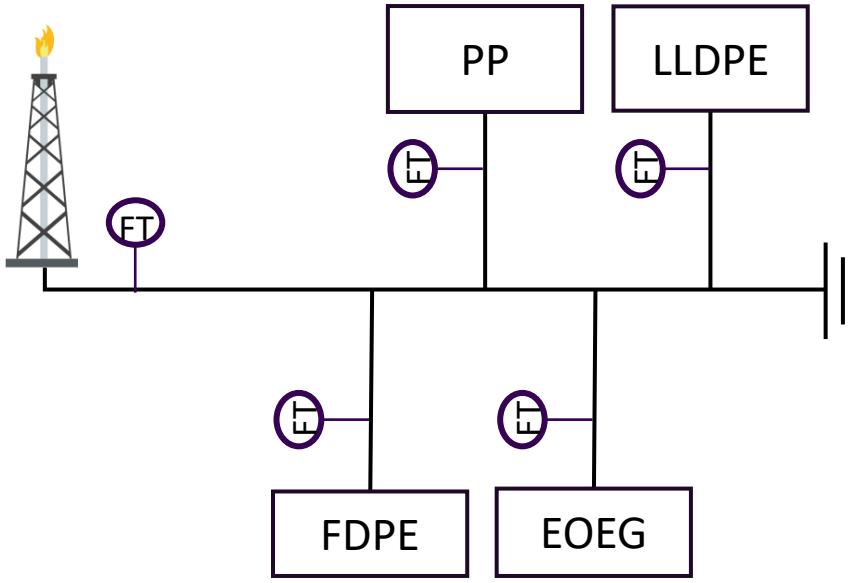
Over 180 Flare Sources

Challenge #2

No flowmeter available at Battery Limit of units in Cracker Complex



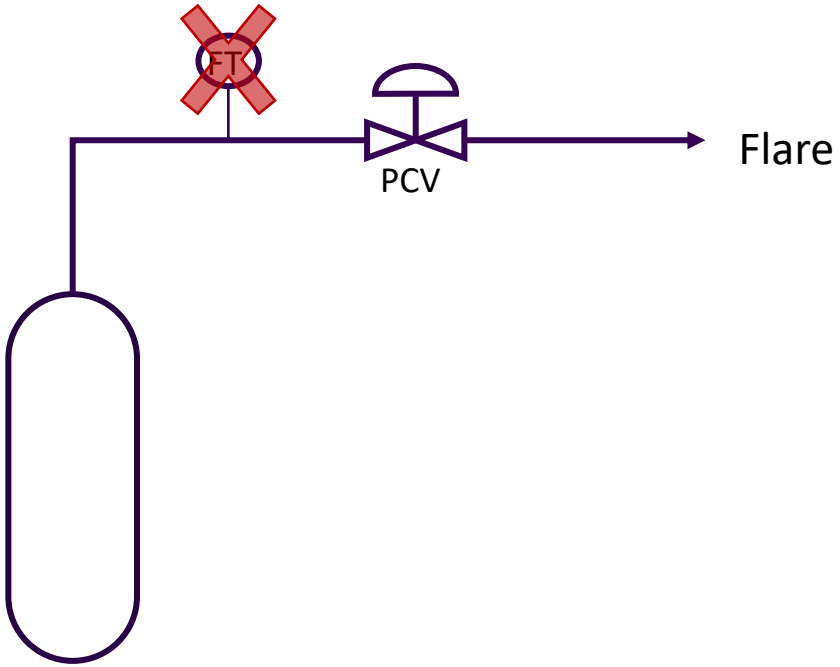
Cracker Complex



Petrochemical Complex

Challenge #3

No flowmeter available at equipment level



Equipment Level

No. of identified PCVs:

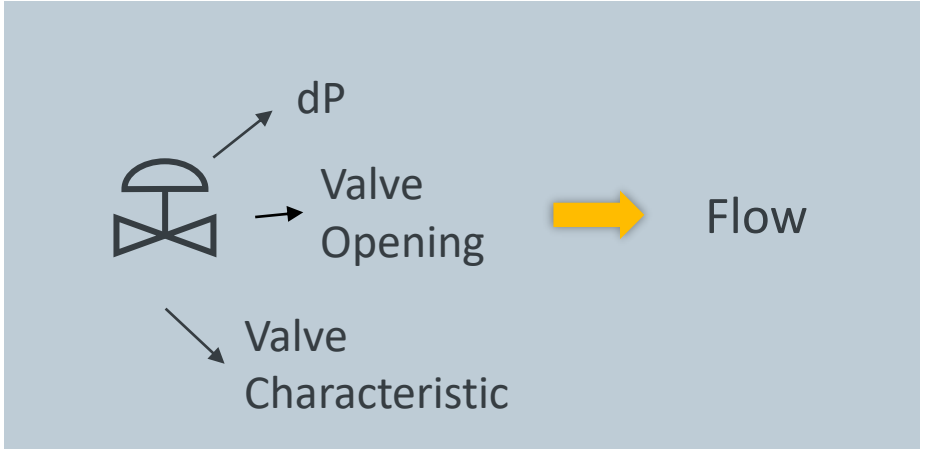
124 Refinery

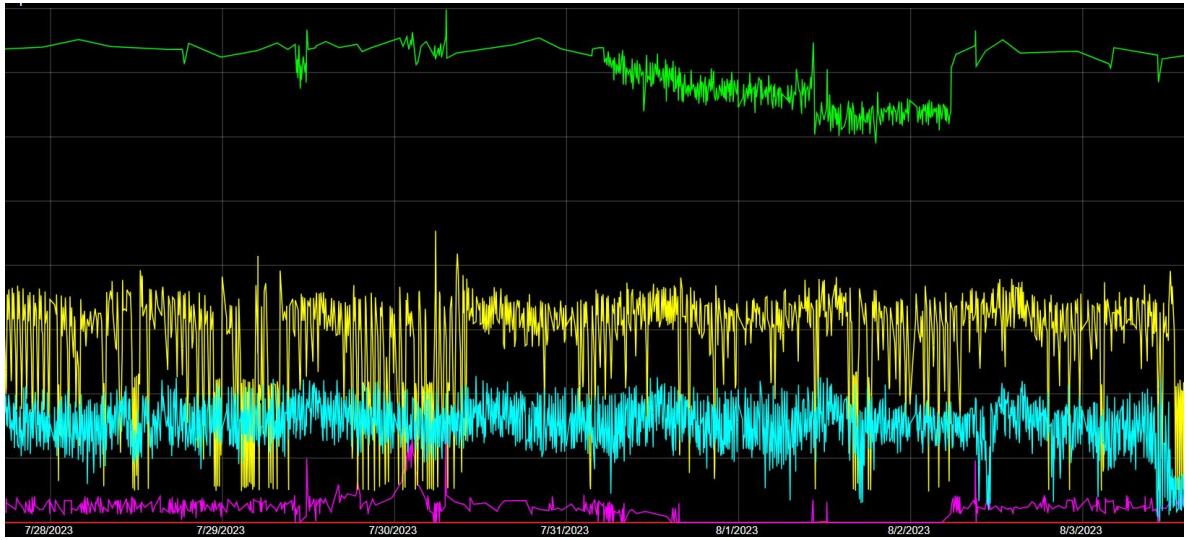
45 Cracker

19 Petchem

Gain Insight Through Data Transformation

- Utilize available data from control valve to find correlation and estimate the flow for each flare source with control valve.
- For unit without flowmeter at battery limit, flare flow is estimated by totalizing the estimated flare flow at the identified flare sources.
- Quick identification of the source of flaring based on trend.

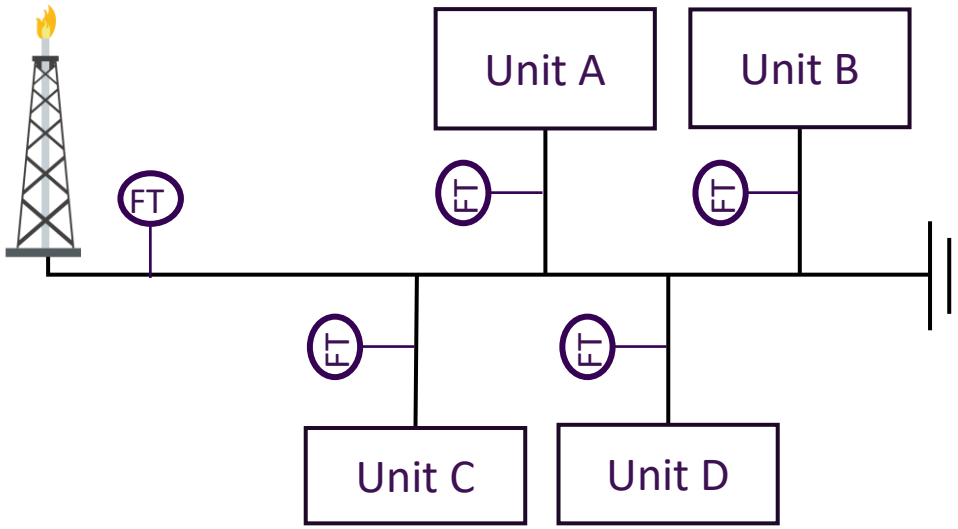




Flare flow from 5 flare sources in Unit A

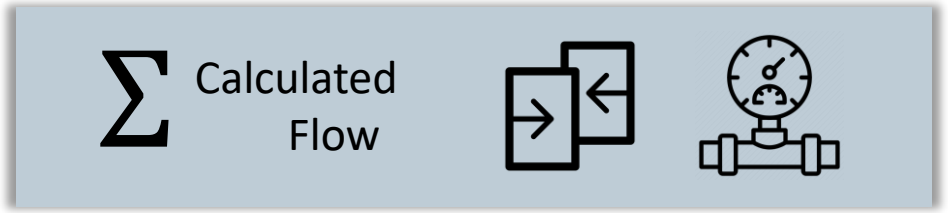
Gain Insight Through Data Transformation

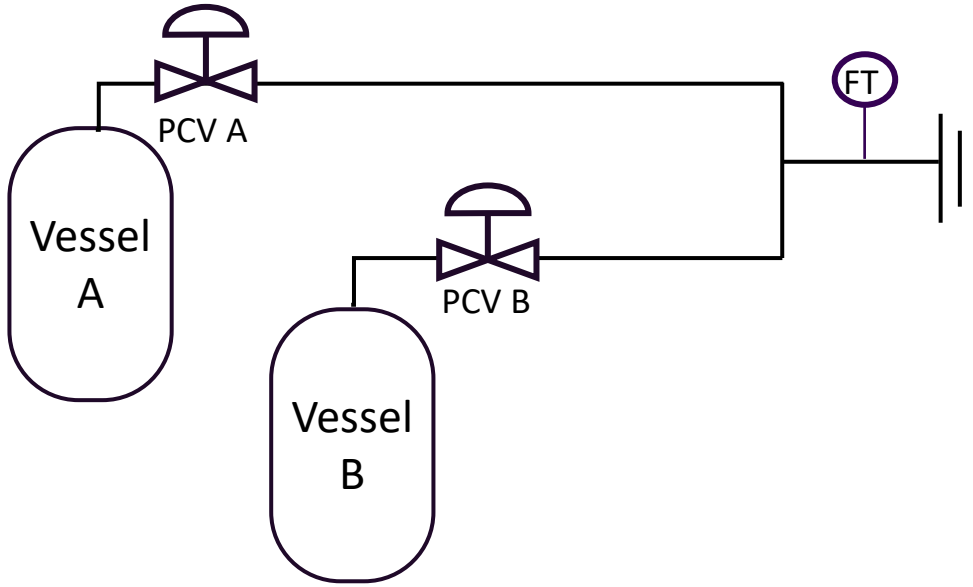
- Calculated total battery limit flow is compared with main flowmeter at flare stack to verify its healthiness.
- Total calculated flow for each unit is compared with available flowmeter at battery limit to verify its healthiness.



$$\text{Tolerance} = \frac{\text{Flare Stack Flowmeter} - \Sigma\ \text{Unit Flowmeter}}{\text{Flare Stack Flowmeter}} \times 100\%$$

Main Flowmeter Verification

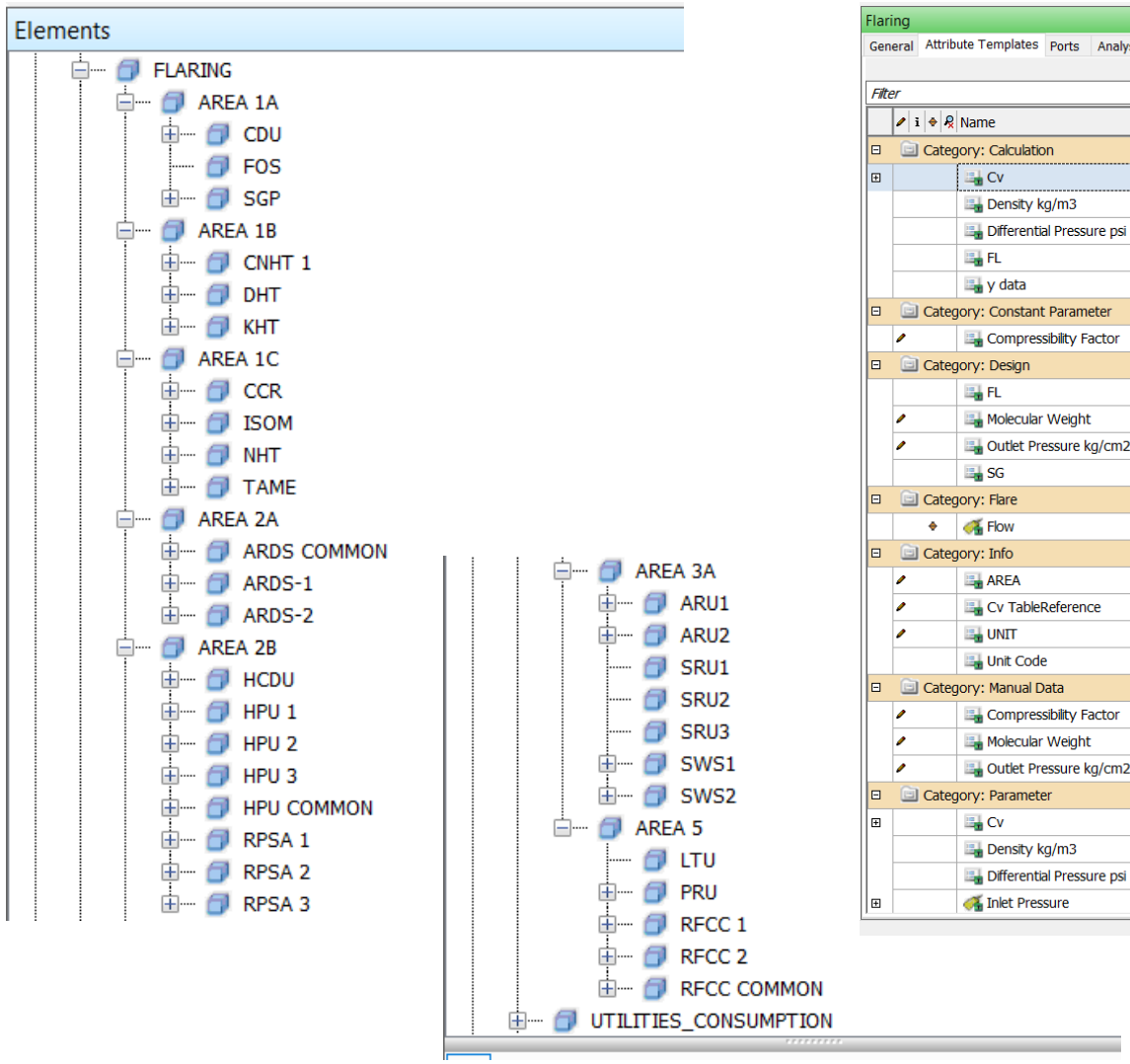


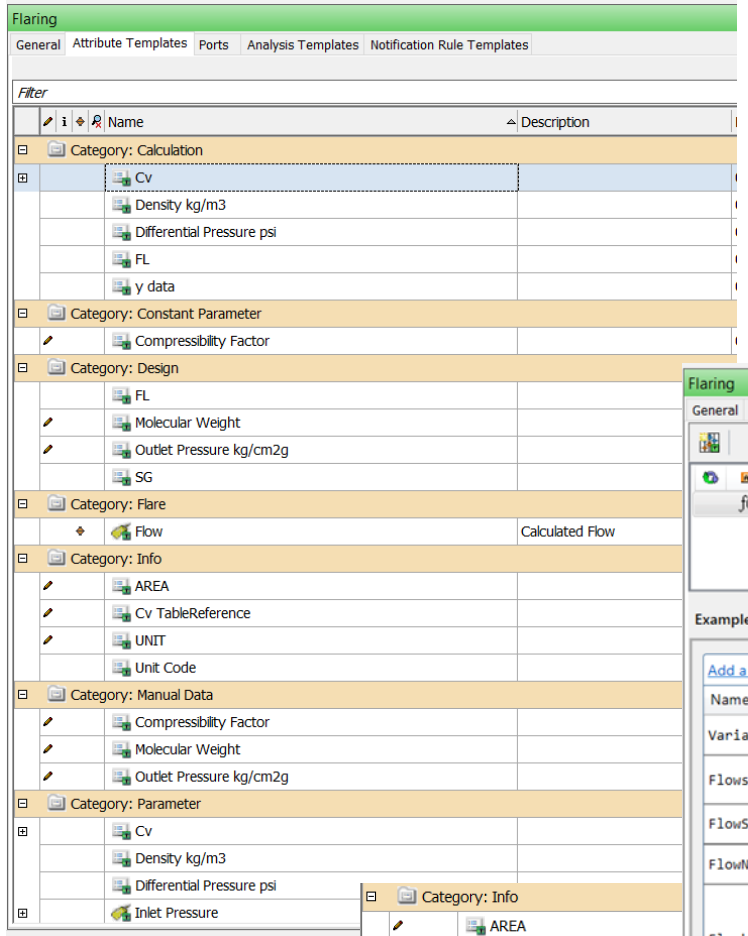


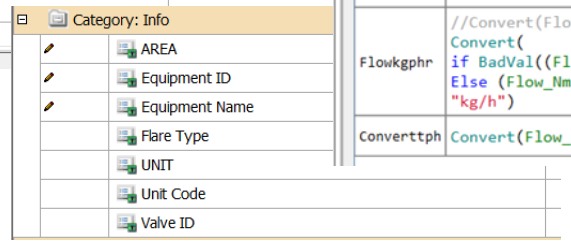
Σ PCV Calculated Flow ⇌ Battery Limit Flowmeter

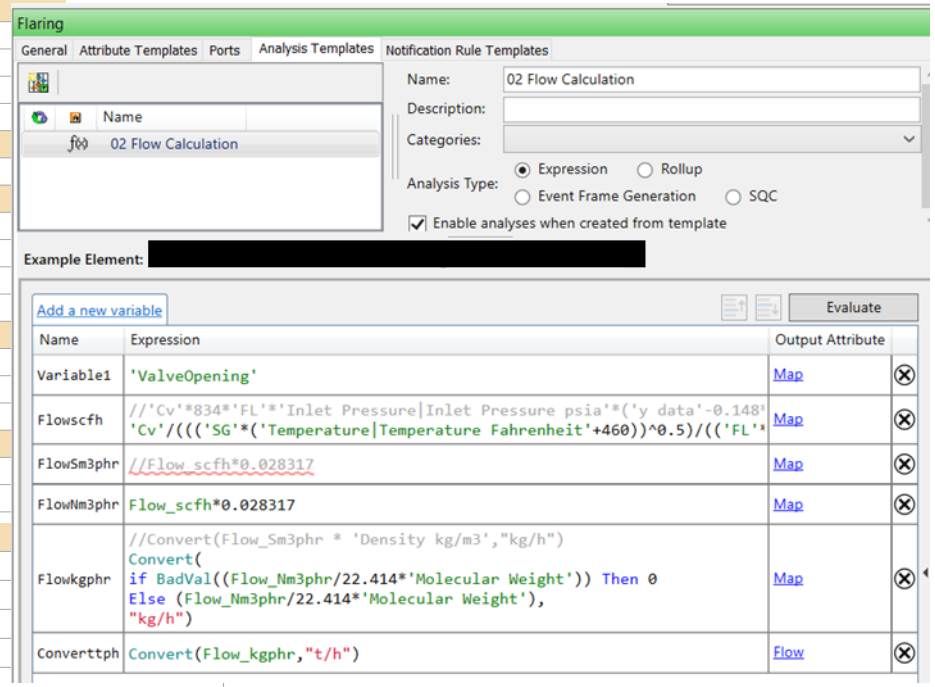
Unit Battery Limit Flowmeter Verification

Solution: PI Asset Framework



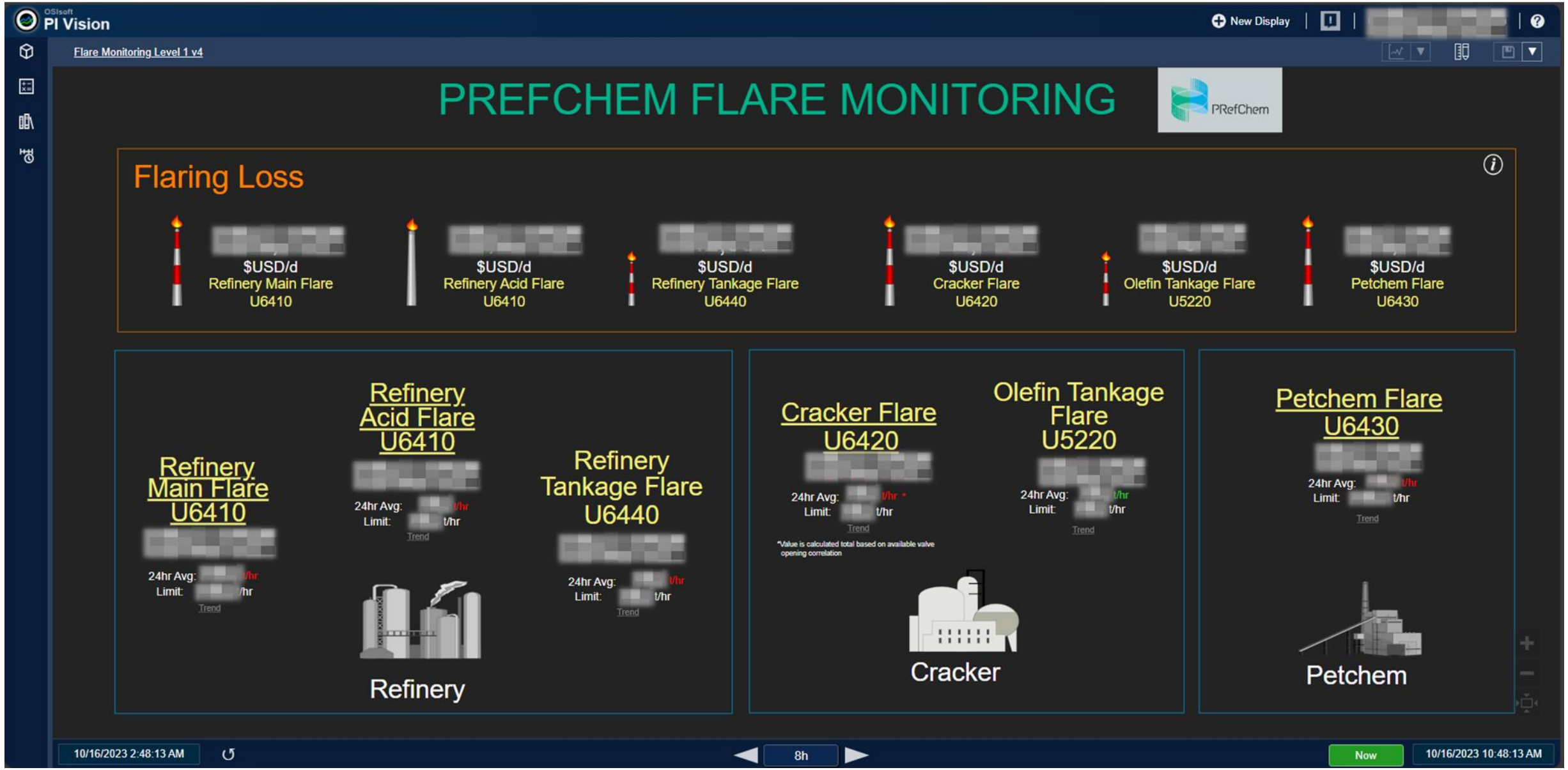






- Template to calculate flow based on control valve opening.
- Integrate information on current valve opening, valve tagname, equipment name.

Flare Minimization Identification Made Easier



Easy identification of flare source by unit through dynamic trending

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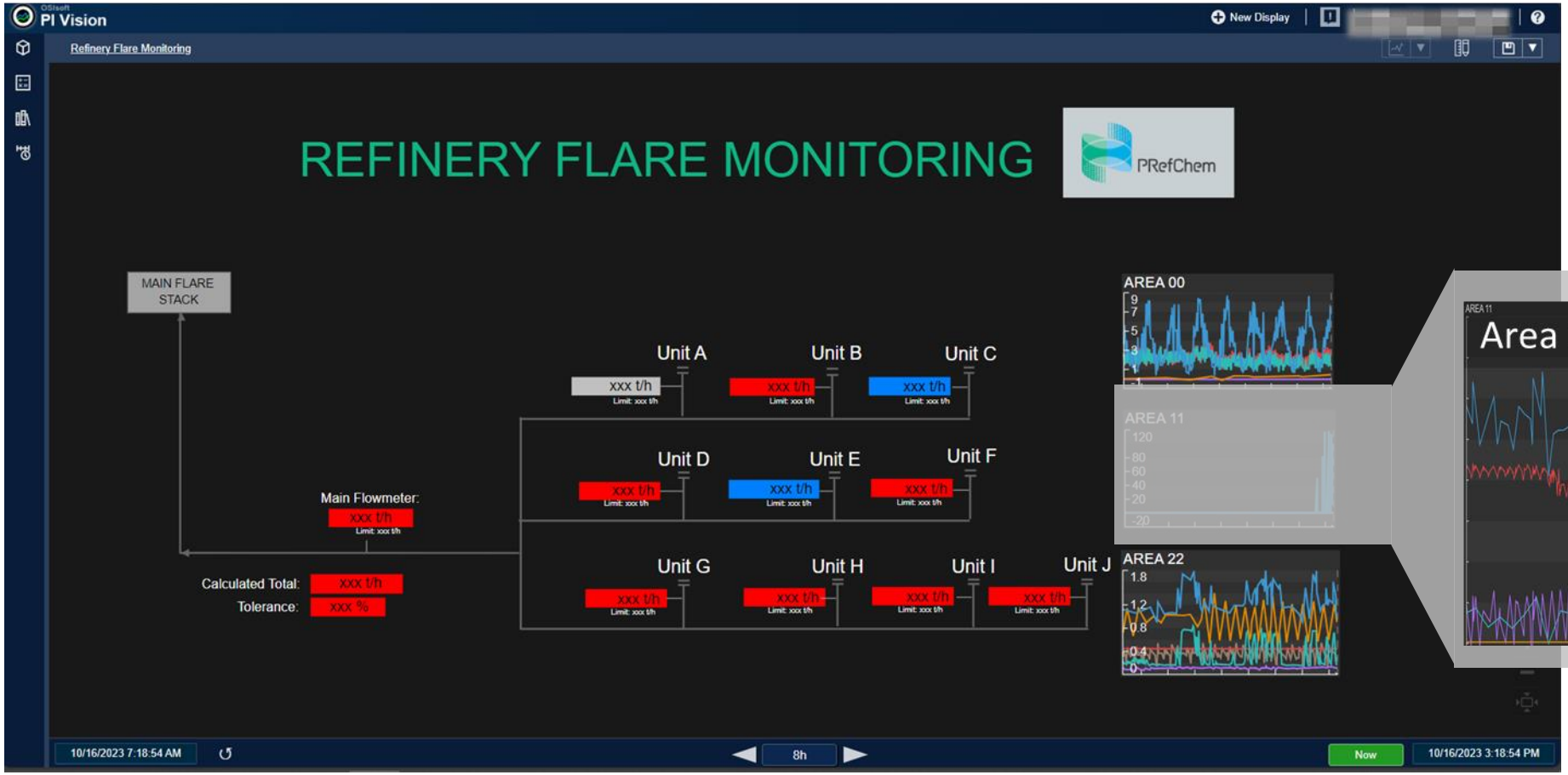

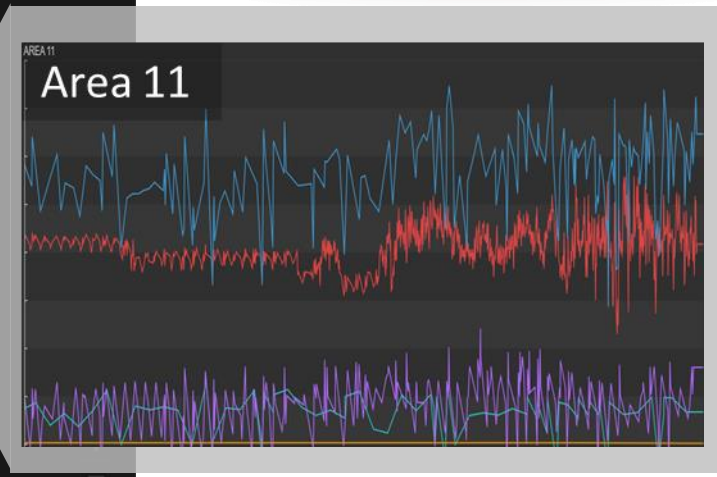

Overview of Refinery Complex where all units' flaring can be seen in 1 page

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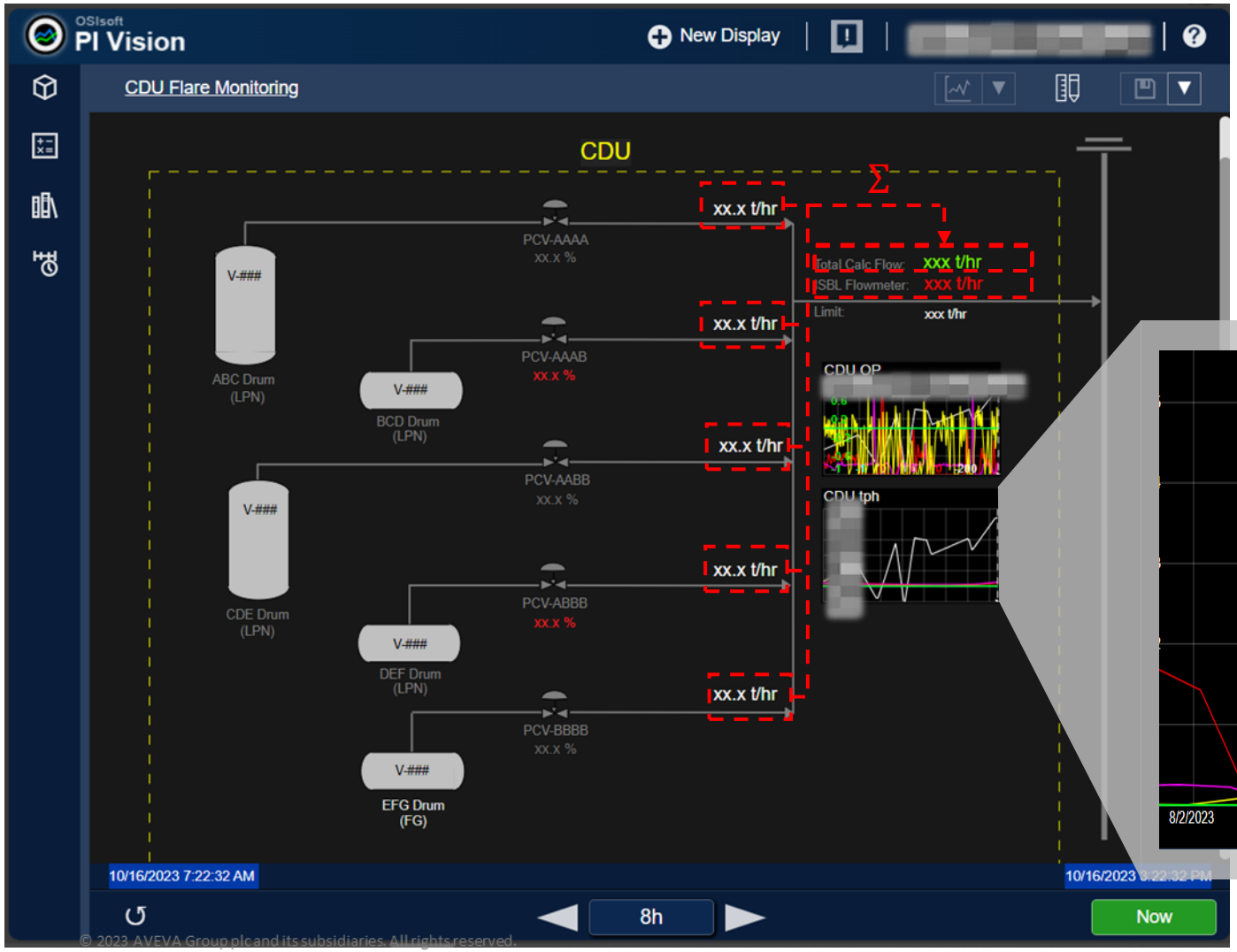
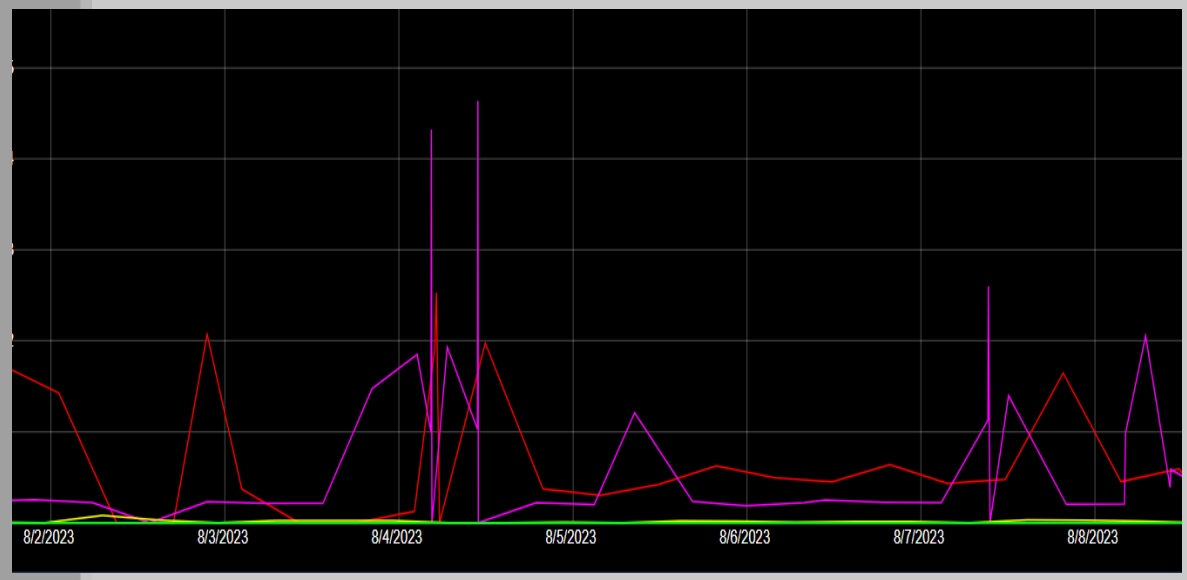
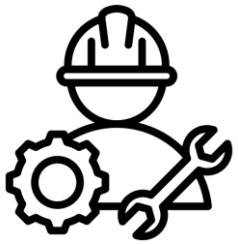
Unit level monitoring: instant flare source identification through graphical and trending visualization



Battery Limit flowmeter healthiness can also be verified with the total calculated flow



Reporting and Monitoring



- Utilized by **Operations, Process Engineer and Environmental Engineer** as part of compliance and reporting.
- Higher **management** able to view summary of the plant's performance.
- Detailed flaring source identification by the **Energy & Utilities Engineers** for performance assessment and reduction plan when required.

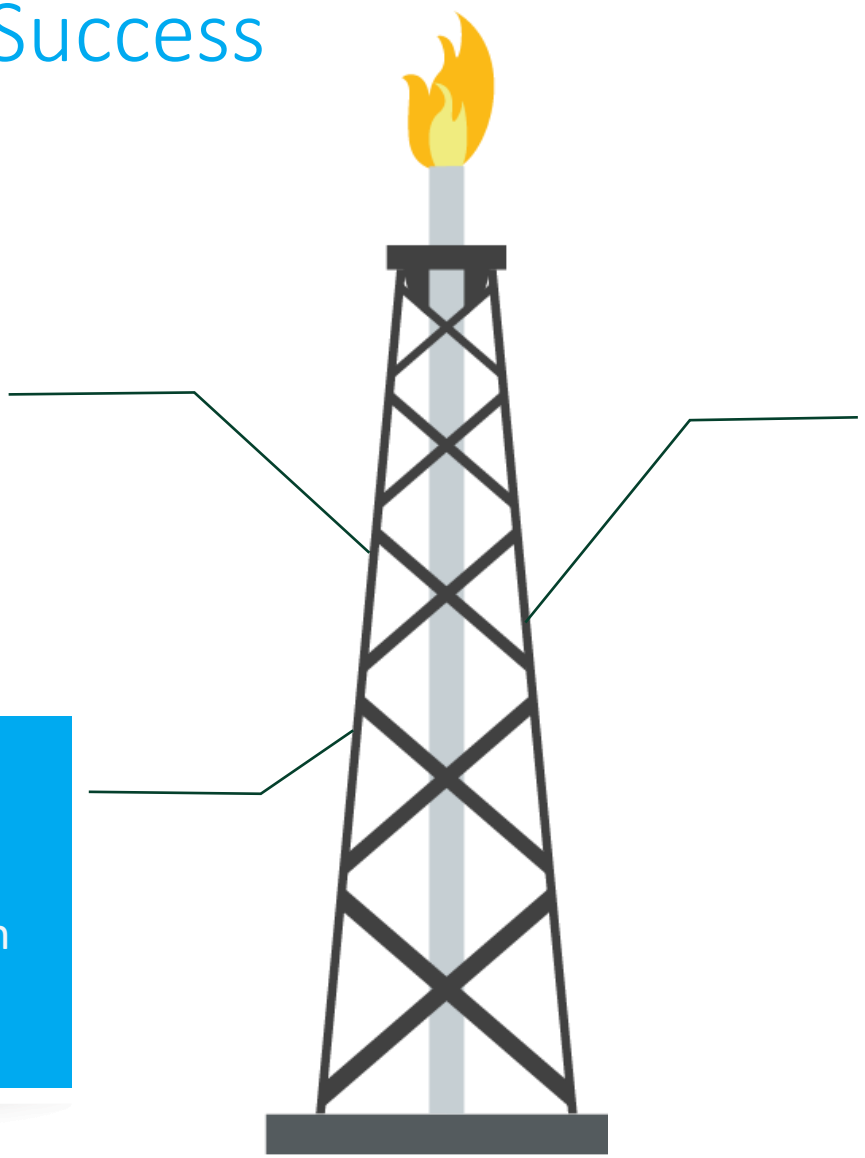
What's Next?

- PI Event Frame Configuration to capture flare frequency and duration by each source
- PI Notification to alert operations and engineers, and escalations

Flare Minimization Success

5% Reduction

HCDU hydrogen flaring optimization during start-up



7% Reduction

HPU Shift Gas flaring minimization prior to routing to PSA by improving procedure and optimize unit stabilization time

3% Reduction

Refinery off gas flaring reduction through improved export to header procedure

Drive Optimization and Data Reliability

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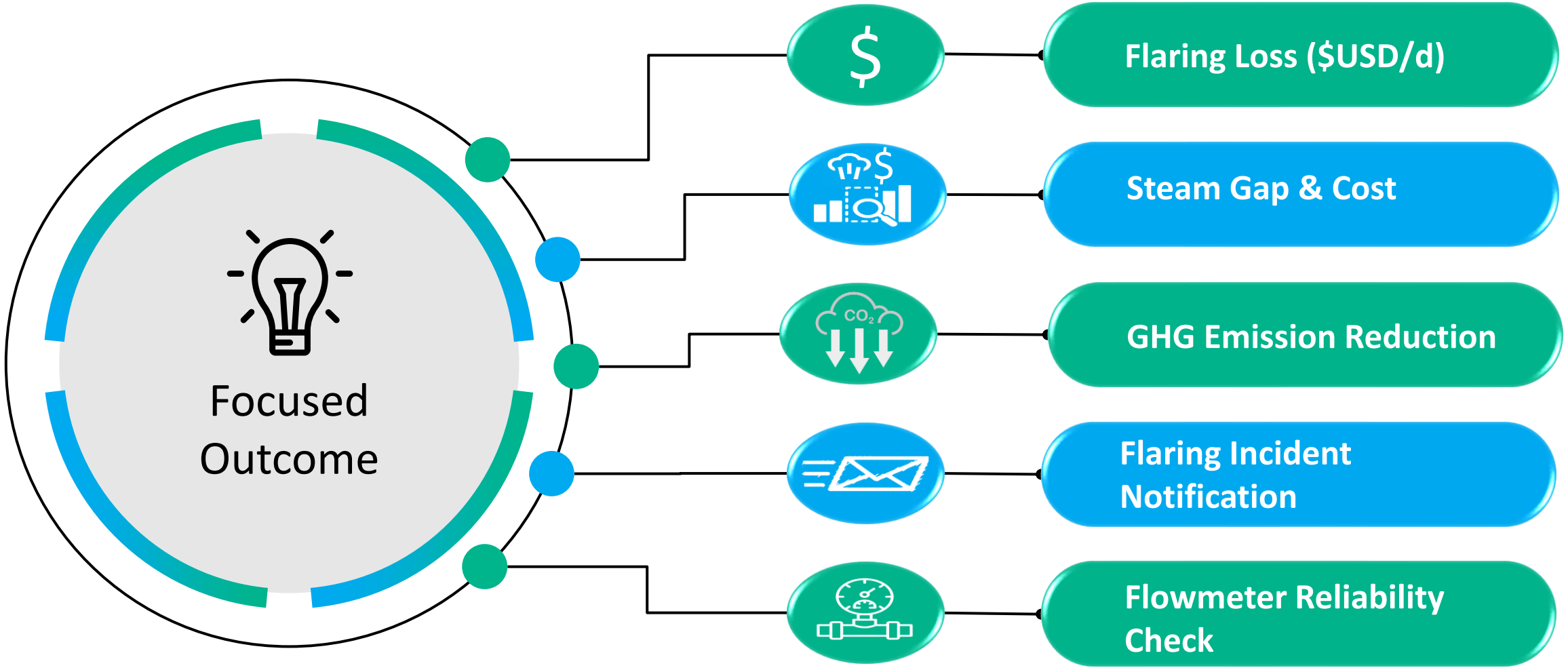

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World Class Efficiency and Sustainability

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Challenge

- **Quick identification** of flaring amount and its source with **unavailable direct data** and unorganized information.
- **Minimize flaring** as part of PRefChem's emissions reduction and sustainability efforts

Solution

- **High volume** of data transformation using PI AF.
- Visualization for **quick identification** using PI Vision for **timely** operational rectification.

Benefit

- **Improved** flare identification process and achieved more than **15%** of flare reduction.
  - 5% reduction HCDU hydrogen flaring optimization
  - 3% refinery off gas flaring reduction
  - 7% HPU shift gas flaring minimization

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Questions?

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State your name and company.

Please remember to…

Navigate to this session in the mobile app to complete the survey.

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Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. The company is headquartered in Cambridge, UK.

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