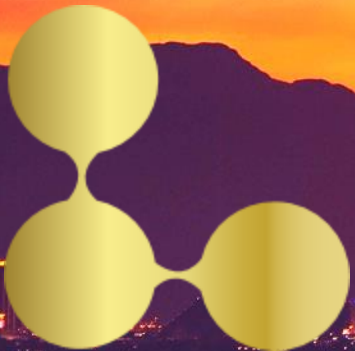


SeeQ®



connect

PERFORMANCE OPTIMIZATION TRACK





Process Cost Curve Visualization

Cameron Cox

International Paper

Data Scientist



International Paper

For more than 125 years, International Paper has been a catalyst in the global economy. We make essential products people depend on every day — from sustainable packaging to absorbent pulp for personal care and other products.

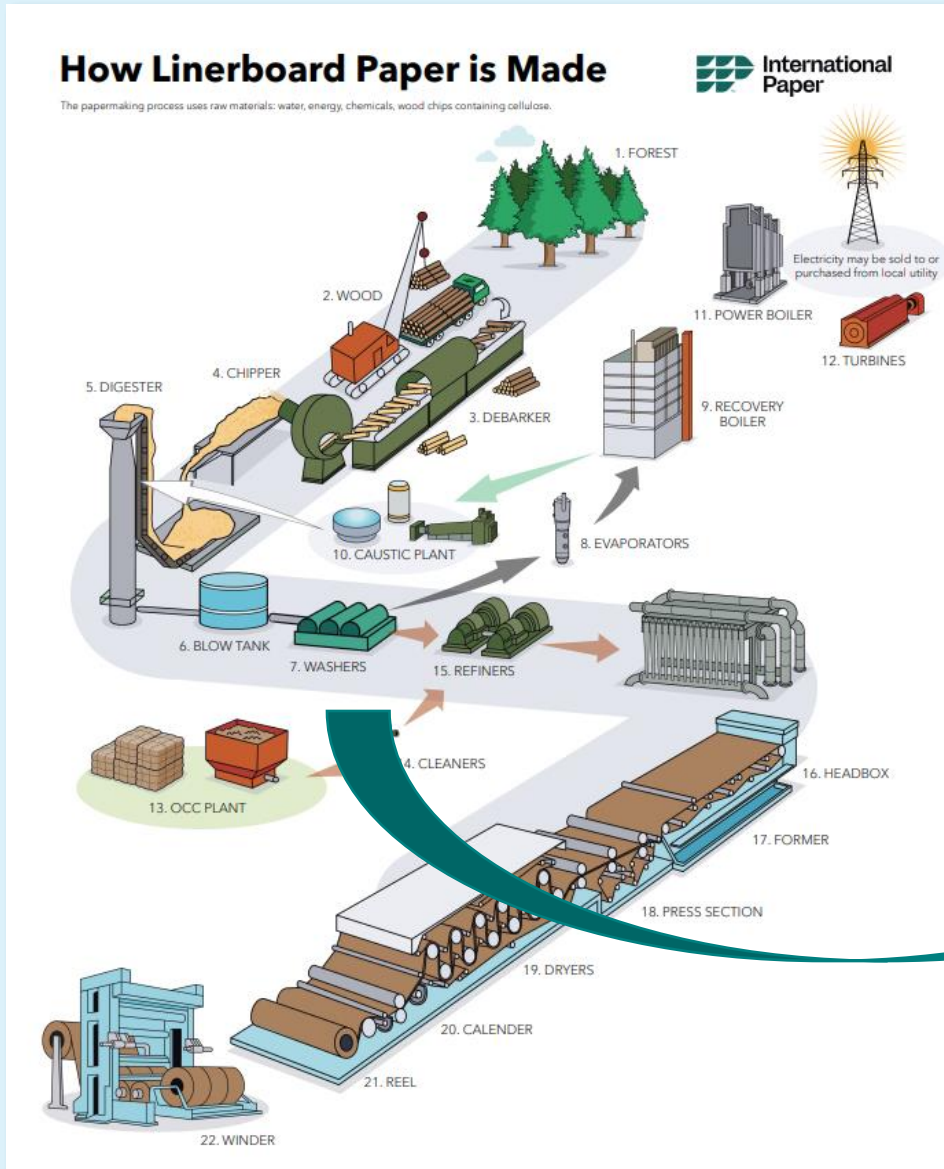
Building on our strong foundation, we're here for what's now and we're **creating what's next.**



Source: International Paper – Corporate Communications



Manufacturing Process



Source: International Paper – Corporate Communications

Problem Statement

Every few years, our production facilities undergo internal audits that provide recommendations for improving processes by analyzing historical data and expenses.

Mills would need to wait for an audit cycle to assess previous performance against standard costs.

What if we could gain insights into the connections between our monthly expenses and ongoing processes in real time?



Daily Washing Costs Dashboard

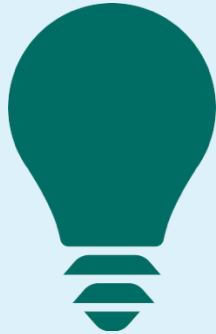


Goal

The purpose of the wash cost curve was to establish a real-time washing cost visualization that would allow the mill to evaluate the effects of pulp washing within the fiber and liquor cycle.



Dedicated Cross
Functional Team



Brainstorming
Sessions



Customer
Ideation
Sessions

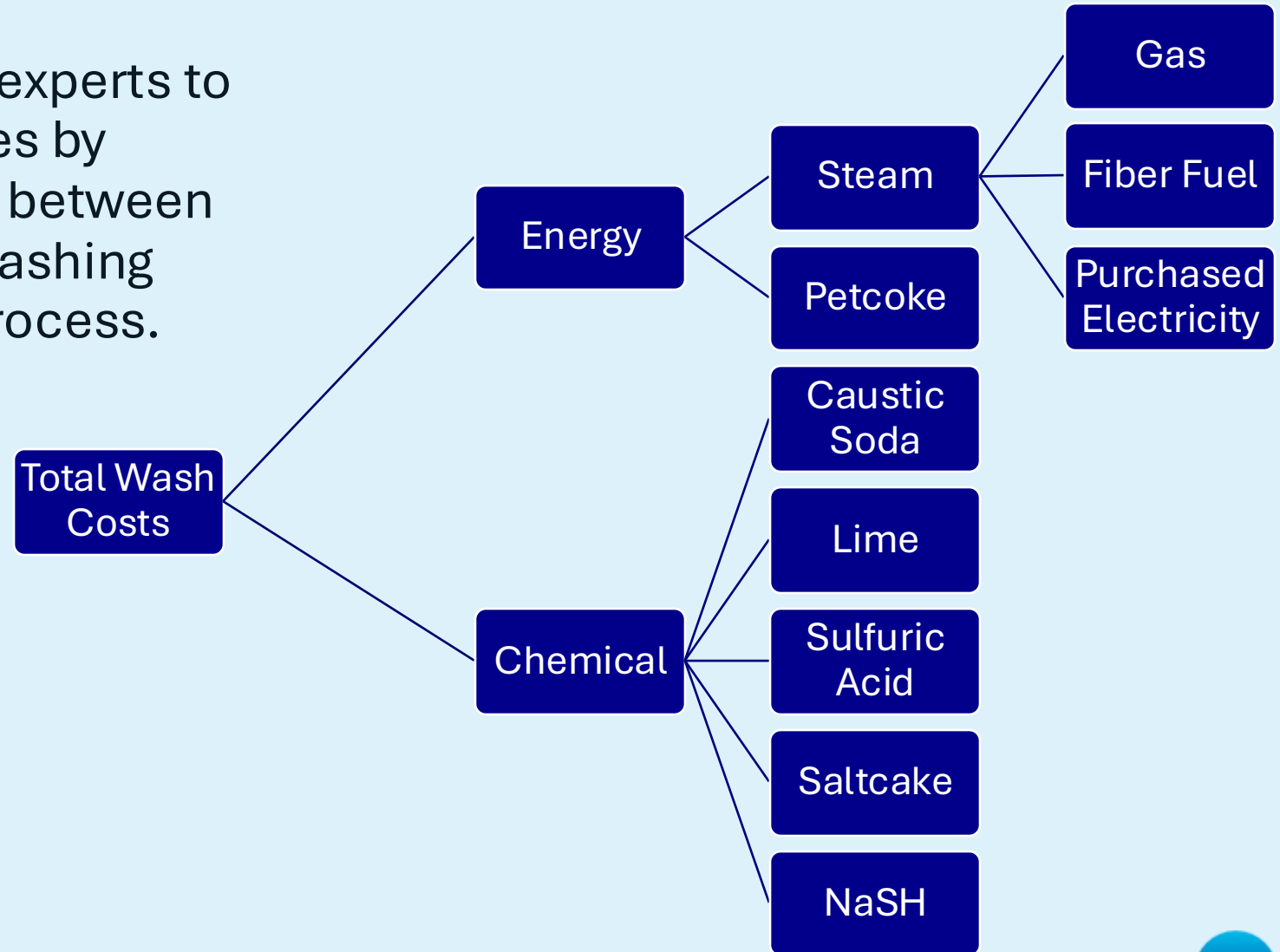


Sustainable
Innovation



Development – Data Acquisition

Collaborated with subject matter experts to develop real-time wash cost curves by utilizing established relationships between process raw materials and pulp washing within the brown stock washing process.



Development

- Created continuous indicators to monitor the usage and costs of raw materials
- Used the data on raw material consumption and prices to calculate overall energy and chemical washing expenses (\$/t)
- Formulated indicators for assessing metrics based on standard washing conditions
- Set up signals to evaluate the variance between present washing costs and the baseline
- Generated daily savings in washing expenses (\$/day)

| Name | Average |
|--|---------|
| Total Wash Costs | - |
| Energy Costs | - |
| Chemical Costs | - |
| Incremental Wash Cost from Baseline Washing (\$/t) | - |
| Wash Cost Savings (\$/day) | - |

Visualization

Wash Cost Visuals Dashboard

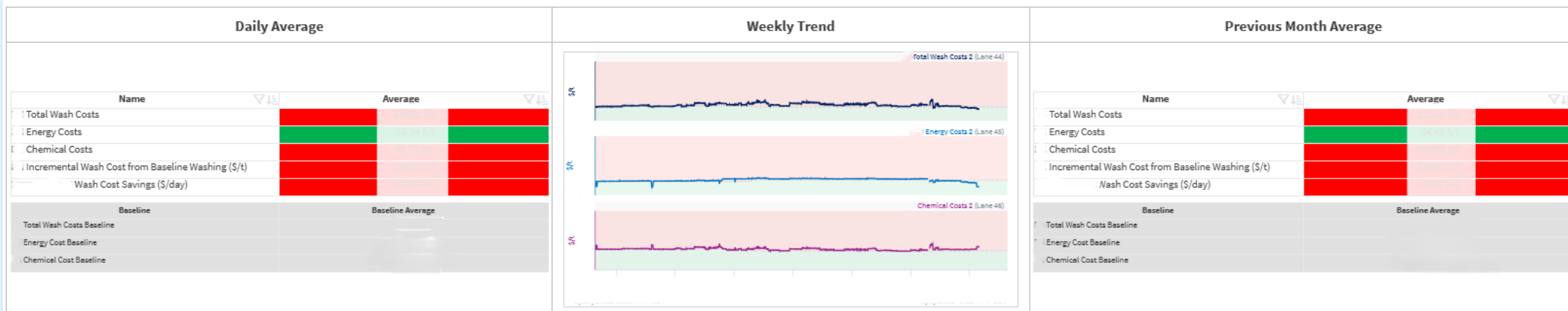
How to Interpret the Graphs

Anything highlighted green is an improvement over the baseline for that value, and red would indicate performing worse than baseline.

How to Use the Wash Cost Dashboards and Parallel Plot

If the wash cost value is highlighted red, then the \$/t is higher than that during the baseline period producing no savings. The incremental wash cost from baseline washing shows the difference between the current wash costs from the baseline. The daily wash cost savings calculates the potential savings by taking the wash cost (\$/t) and multiplying it by the current production rate. Use the graphs on this dashboard, and the level 2 drill down dashboards, to determine the key drivers for the wash costs.

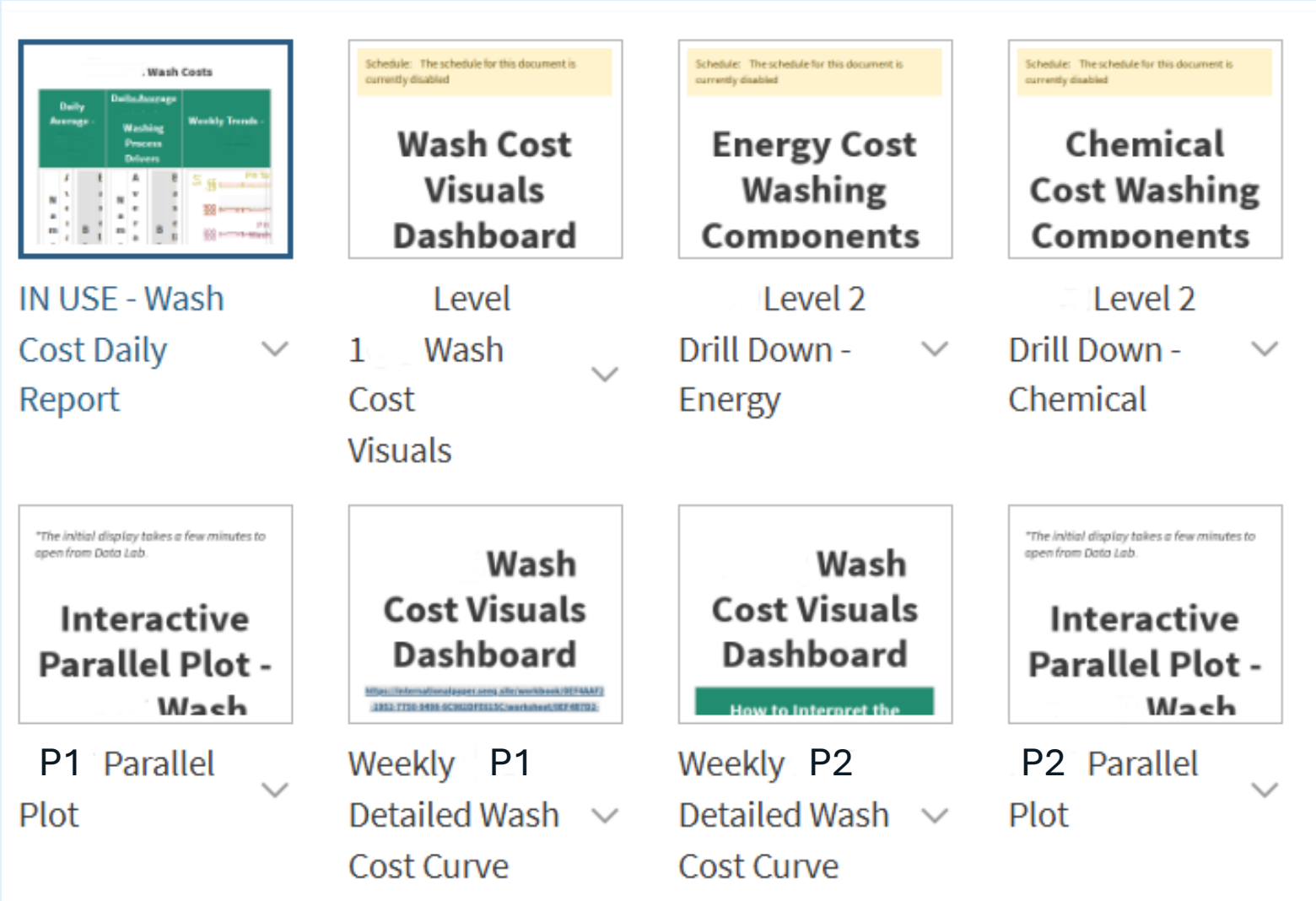
1. The process is driving the washing costs.
 - Look at the washing process drivers to determine if any of the key washing drivers, such as shower flow & production rate, differ from the baseline.
 - Look to see if one component, either Energy costs or Chemical costs, are driving the overall Wash cost. Use the Level 2 drill down pages to determine what the key drivers are for the Energy and Chemical pieces.
2. The monthly pricing changes could be driving the overall washing costs.
 - Use the pricing impacts graphs to see if the raw material pricing has changes significantly from previous months.
3. The last display, the parallel plot, is an interactive tool. It allows for the user to manipulate the sliders to change different process ranges to see if those conditions have ever been met prior, or what the other variables were doing during the time those conditions were being met.



Washing Process Drivers

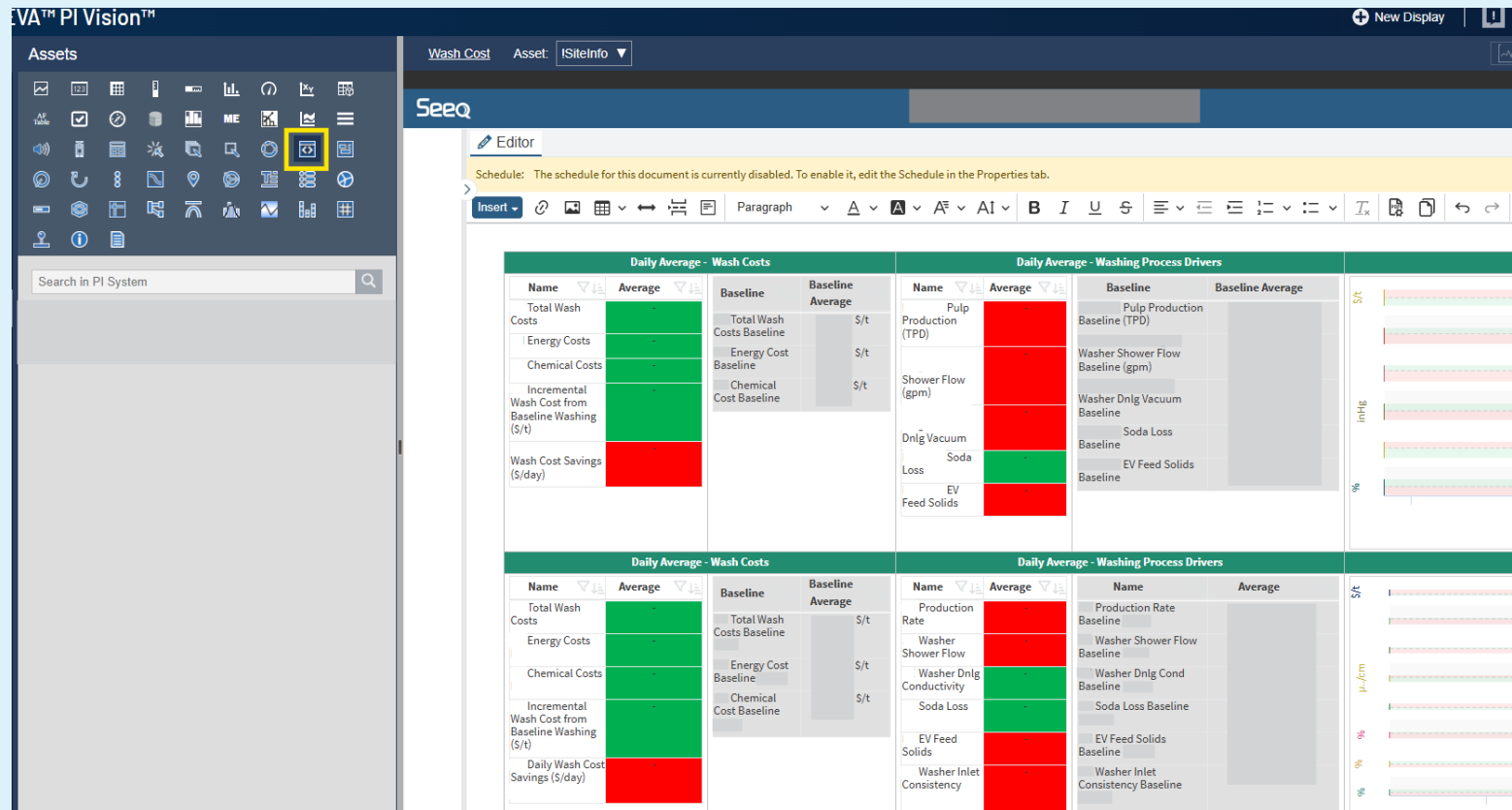


Visualization




Deployment

Alongside the auto-updating and scheduling features in Seeq that enable the automatic sharing of daily reports, the Seeq Organizer can be accessed in PI Vision through the Werusys weruEmbedder.




Ongoing Enhancement


A SQL table that holds the monthly cost data from SAP was imported into Seeq, completely automating the reporting process.

Select Item:  Manufacturing Cost


Access Control

You and others have access  Manage


Item Usages

Discover local and global calculations based on this item  Usages

Description

Notifications (0) 

+ Add Notification

ID 

Maximum Duration

1 mo

SQL

SELECT * FROM (SELECT MonthYear AS Start, DATEADD(month, 1, MonthYear) AS End, SAPPlantNumber, MaterialTypeAbb
r, MaterialGroup, MaterialGroupNumber, MaterialNumber, M
aterial, Amount\$, Consumption, BaseUnits, [Actual Unit Cos
t], [Standard Unit Cost]

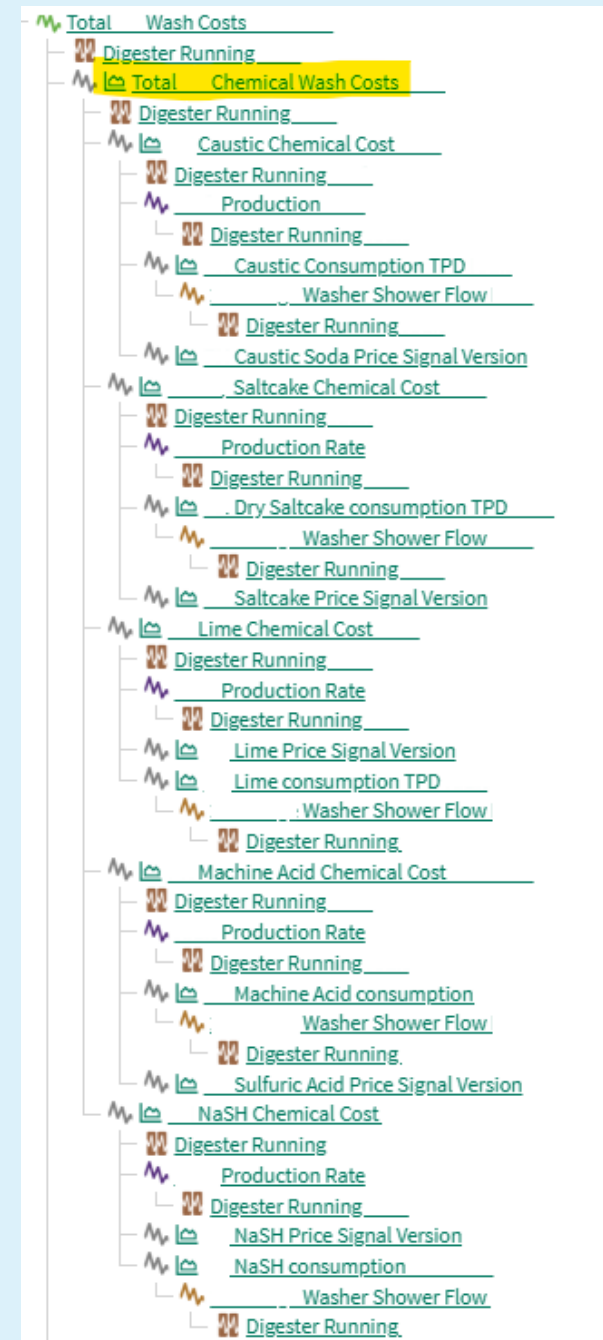
+ Advanced



Seeq Utilization

Seeq Features Used:

- Workbench
 - Conditions and capsules
 - Formula
 - Scorecard metrics
 - AI assistant
- Data Lab
 - Asset tree creation
 - Parallel plot
 - SPy, ipyvuetify, and plotly
- Organizer
 - Auto-updating reports
 - Seeq/IOTA content connector
- Impact Reporting



Learnings

CHALLENGE

Visualization complexity and usability

SOLUTION

Create tailored visualizations for different stakeholders that offer in-depth data with drill-down capabilities and straightforward dashboards. Continuously enhance the interface based on user feedback and testing.

RESULTS

Dashboards that enhance clarity and organization prevent user overwhelm, enabling faster and more accurate decision-making by making trends and cost factors easily identifiable.

Execution Summary

- Several models were simulated employing recognized external modeling methods.
- Calculations were conducted using the Seeq workbench.
- A preliminary prototype was developed in Data Lab.
- Feedback sessions were organized to collect input from end users.
- A Seeq organizer was created to improve user functionalities.
- The Seeq organizer was incorporated into PI Vision using the Werusys weruEmbedder.
- Auto-updating reports were enabled for the Seeq organizer.
- Links to SAP cost data were established.

Impact

Achieved a **64% reduction in washing costs** (\$/t) in comparison to the costs from six months ago, following the implementation of dashboards.

What's Next

Plans include incorporating additional operational conditions from the pulp mill into the model and calculations.

There are also plans to expand usage to other facilities, with the system currently operational at two mills and applicable to other processes.

SeeQ®



connect

THANK YOU!

