2023 Sustainability Whitepaper

Accelerating Sustainability Outcomes with Advanced Analytics

Introduction

Running a sustainable operation is no longer an option for process manufacturers, it is now a global strategic imperative.

In 2015, the United Nations defined its Sustainability Development Goals, a blueprint for a sustainable future that calls all countries to act toward sustainable change by achieving 17 shared goals. These goals, including Clean Water and Sanitation, Affordable and Clean Energy, Responsible Consumption and Production, and Climate Action, spurred a renewed focus on sustainability from the manufacturing sector, acknowledging their moral, social, and economic obligation to not only address sustainability as a top corporate objective, but make the necessary investments to ensure sustainable operation.

Additionally, in 2022, the SEC proposed the "issuer rule," which would require all public companies to disclose specific climate-related financial data and greenhouse gas emissions insights, including those they are directly responsible for and those emitted from their supply chains and products. Later that year, the SEC also proposed the investor rule, which would require ESG-focused funds and firms to expand on their climate disclosures beyond materiality.

While government and regulatory trends may be driving the shift toward sustainability, improving key performance indicators (KPIs) will provide multiple benefits to process manufacturers when they join the movement. Measurable progress toward these KPIs will provide better access to capital for new investments, along with a more efficient, climate friendly operation. The efficient use of raw materials, resulting in less waste and lower energy consumption, provides significant cost savings. Sustainable practices also boost a company's reputation, giving it a competitive advantage in the market.

Despite these potential benefits, achieving sustainable operation is challenging without a tangible action plan. While responsible operators want to improve, many lack the means to benchmark and track progress efficiently. Fortunately, process manufacturers can now leverage modern, advanced analytics solutions to gain insight into their environmental KPIs and drive measurable progress toward their goals.

Challenges

Frequently, companies do not have an efficient method for presenting and tracking their current environmental performance. Without this insight into current operation, it becomes difficult, if not impossible, to make improvements and optimize.

Access to data

The first step toward finding this insight is accessing the data. From equipment and process data to quality and inventory data, process manufacturers have a variety of existing data sources. This information is often stored in different databases hosted on-premises or in the cloud, such as process historians and asset management systems.

According to Anaconda's "The State of Data Science 2020" report, data scientists still spend approximately 45% of their time preparing their data for analytics as it often includes noise, small spikes, or erroneous values, complicating analyses. Process engineers face similar challenges when it comes to accessing data from many different systems. For example, if an engineer works in a remote operations center and monitors assets across the globe at different plants, each plant may have a different data historian with different naming conventions for IoT sensors. Additionally, each of these historians may have different mechanisms for pulling that data out of and into a format that can be used effectively for analytics.

Measurement

Identifying opportunities for environmental improvement is a necessary step toward change and requires creating sustainability related KPIs. But organizations can't improve what they aren't measuring. Without a modern solution to calculate, visualize, and validate process data, organizations are left using spreadsheets for analysis, which is time consuming, cumbersome, and prone to manual mistakes, preventing deep analysis of broad business processes necessary to increase efficiency and profitability.

Barriers to Action

Without the right solutions and KPIs, organizations are at best reactive to their environmental performance, responding to events after the fact when they are identified in monthly, quarterly or even yearly reports. Few, if any, sustainability related KPIs are calculated and monitored with sufficient granularity and timeliness for operations teams to take informed action. Even for organizations receiving near real time visibility into their process data, labelling what “good” looks like can be quite challenging, particularly in operations with variable feedstocks, product slates, and energy sources.

More challenging are those emissions that, by their nature, cannot be measured directly—for example, fugitive emissions of storage and transmission systems, which form a significant proportion of total emissions in some sectors.

Seeq Self-Service Advanced Analytics Addresses Sustainability Challenges

Seeq self-service, advanced analytics addresses the key challenges prohibiting the process industries from achieving their sustainability goals in three critical ways:

Connect to Live Data

Seeq connects to live data from multiple sources for near real-time analysis and action.

Analyze Sustainability KPIs

Seeq users can measure, calculate and visualize key metrics for emissions, energy, water and waste reduction.

Operationalize Insights

Seeq enables users to identify excursion events and successes in near real time, empowering teams to iterate and innovate faster.

By leveraging Seeq, teams gain visibility into current environmental performance at each production facility, helping process manufacturers shift away from the reactive dynamic. This empowers local operational teams to identify excursions and respond in a timely manner to make tangible impacts when issues occur.

Using Seeq, manufacturing organizations can connect disparate data sources to a single cloud-based application, immediately alleviating the challenges of live data connectivity. Seeq provides simplified data cleansing tools and contextualization, including smoothing filters and time stamp alignment, empowering SMEs to quickly derive meaningful and reliable insights across all available pieces of equipment. Equipped with live data connections, SMEs can apply their analyses to near-real-time data.

By removing these data access barriers, SMEs can leverage the solution's purpose-built, point-and-click interface for descriptive, diagnostic, predictive, and prescriptive analytics to improve environmental performance based on transformational data insights. Seeq incorporates visualization into the analysis process, empowering SMEs to immediately visualize the impact of their analysis, identify missteps and successes in real time, and iterate and innovate faster.

The ability to visualize data from various sources makes it increasingly straightforward to communicate actual environmental performance metrics in a timely manner. For example, Seeq enables SMEs to identify relationships among environmental KPIs and process parameters. When these relationships are understood, entire processes can be continuously monitored to identify and mitigate environmental excursions. This continuous monitoring ensures rapid reaction to events, while facilitating root cause analysis by SMEs.

A variety of techniques to validate process parameters in near real time and adjust for known disturbances such as fuel gas composition changes and combustion efficiencies are being developed. By aggregating these process parameters using Seeq, organizations can create enterprise level reports that update frequently based on rolled up data from many units or plants while maintaining a historic audit trail of changes.

Seeq also enables organizations to maximize the effectiveness of SMEs, who may work from different sites or countries, by enabling streamlined collaboration, knowledge capture, and reporting.

Key sustainability initiatives

Using a modern analytics solution, such as Seeq, can help global manufacturers achieve key sustainability milestones. By leveraging cloud-based, self-service, advanced analytics solutions in process manufacturing, companies can overcome many challenges and barriers to achieving measurable gains.

The sustainability-driven activities that support these top initiatives fall into one of three broad categories:

1. Net Zero Pledges:
Fundamental changes to supply chain, sourcing, and manufacturing processes to reduce greenhouse gas emissions and carbon footprints.

2. Efficiency and Impact:
Increasing operational efficiency and minimizing environmental impact through energy, water, and materials reduction.

3. Reporting:
Reporting across the enterprise and value chain driven by the need to meet regulatory and fiscal requirements.

Use Cases

The process industries are embracing advanced analytics solutions to take full advantage of their growing data volumes to solve increasingly complex sustainability use cases.

1. Net Zero Pledges

Reducing carbon emissions

One global chemical manufacturer pledged to reduce its carbon intensity in half by 2030. The company's first step toward this goal was understanding the current state of its operations. Historically, this analysis was cumbersome and, therefore, only conducted once per year, but carbon intensity calculations are key to understanding the overall carbon footprint of a process.

By deploying Seeq, site engineers gained real-time awareness of utility stream carbon intensity. The software performed this calculation by converting process sensor data into carbon mass equivalents, providing SMEs the ability to easily compare current carbon intensity with targets for a given production quantity. Breaking the carbon footprint into individual utility streams empowered the operations team to identify the largest contributors, along with the methods to combat them.

These near-real time carbon intensity estimates enabled the chemical manufacturer to make data-driven decisions to target carbon reduction on an ongoing basis, and as a result, it is steadily making measurable progress toward the goal.

2. Efficiency and Impact

Justifying an idle boiler

To reduce the amount of wasted energy and, therefore, carbon emissions, process manufacturers require methods to identify time periods of wasteful operation, such as excessive electricity consumption or vented steam. This waste can be quantified as either a financial loss or CO2 emissions equivalent, providing common benchmarks for comparing alternative operating strategies.

A major refining company leveraged Seeq to justify idling one of the boilers in a dual-boiler operation during the warm months of the year. The company's SMEs configured the platform to identify time periods when the dual boiler system was operating at minimum firing rates while venting steam. Examining these periods, the team aggregated potential annualized steam savings.

The SMEs then analyzed historical data to understand the probability of a boiler trip, which could have a significant financial impact in a single boiler operation, and weighed the potential steam cost and energy savings against the risk—defined as failure probability multiplied by financial consequence—of running a single boiler.

This analysis provided the necessary data to justify idling one of the boilers during prolonged periods of warm ambient weather, saving the refiner an average of $500,000 per year in vented steam costs. This operational change also reduced the company's carbon footprint by decreasing energy required to run the boiler system.

Energy consumption prediction models

Allnex, a specialty chemical company, wanted to create energy models of their critical assets. Creating prediction energy consumption models is difficult, and in most cases the models are rarely updated, which makes them obsolete quickly. Relevant data needs to be cleansed, aligned, and then featured in a sample that can be put into a model. Using Seeq, the company easily developed and updated models, many with multivariate complexity, to consistently identify energy use reduction opportunities.

Any models developed should represent the process, and simple tests can be done to confirm conformity. For example, when opening a valve feeding a steam jet, if something does not look right, the issue may be in the instrumentation, or the control loop associated with it. The model allows the organization to discover relationships defined by energy models, creating an effective energy reduction program that consistently delivers results and attractive ROI.

3. Reporting

Emissions reduction and reporting

At Chevron, a top 10 global oil and gas company, SMEs used Seeq to automate their regulatory compliance reporting. The solution pulls data from the process historian and applies calculations defined by process engineers to report emissions levels accurately and efficiently, ensuring regulatory compliance.

As new data becomes available in the data historian, the calculations and reports are automatically updated with the latest information. By using Seeq, the company has reduced the time it takes to generate a report from days to a few hours. But, more importantly, having emissions performance information readily available with the latest data empowers the company to shift from a reactive to a proactive approach to identify issues quicker, instead of just reporting after the fact.

Conclusion

With increasingly stringent regulatory requirements, threats to natural resources, and the ever-growing public priority on sustainability, production efficiency and emissions reduction strategies are more vital than ever for companies to thrive. This is nearly impossible when left to the technologies of the past, but advanced analytics solutions like Seeq help operations teams access data, generate insights, and accelerate actions for performance improvements.

These solutions provide the means for collaboration and access to the years' worth of operational data that is already available to process manufacturing organizations. Using advanced analytic solutions to reach sustainability goals ensures an organization is fully leveraging its workforce's expertise.

As more organizations leverage data and advanced analytics to understand their current environmental performance, identify opportunities for improvement, and act on those opportunities, the industry will see more examples of measurable progress being made and scaled across assets, as well as a shift toward proactive approaches that drive sustainable practices.

Ready to achieve your sustainability goals using advanced analytics?

Seeq can help

Contact Seeq to speak with one of our industry experts and ***Schedule a demo today.***