



Proactive Decision-Making for Emissions Management: The Roadmap to Net Zero

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Executive Summary

Shareholders, financial institutions, governments and intergovernmental commissions are exerting pressure on industry to progress towards a target of achieving net zero carbon emissions by 2050. Many major emitters—including industrial producers— have pledged to make more progress and be more transparent regarding their efforts and results in emissions management.

For many companies, this shift will require a significant change in how they operate. Most are currently only able to see and report on their enterprise-wide carbon emissions yearly—and it is often a backwards-looking view of the data. Quite simply, this lack of real-time insight into emissions will not suffice as companies must understand their options, decide on actions and track progress against net zero commitments across their entire value chain.

New digital technology solutions give industrial producers a valuable new option for emissions management and avoidance: real-time visualization of emissions data across the entire organization. Companies that implement these tools can quickly move from a reactive approach to proactively making informed decisions to resolve, and even avoid, critical issues and in the process achieve 15-20% of emission reduction potential simply through faster and better operational decision-making.¹ This is how forward-looking businesses are achieving net zero while also protecting profit.

Introduction

Emissions reduction will be a focal point of the 2023 United Nations Climate Change Conference (COP28) as it was during COP27.

COP28 will be a milestone opportunity for the environmental lobby and the global energy industry to come together. COP28 President-Designate Dr. Sultan Ahmed Al Jaber (also the CEO of ADNOC, one of the world's largest energy producers) has urged energy industry peers to accelerate their efforts and demonstrate progress against their pledges to reduce greenhouse gas (GHG) emissions—and to come to COP28 showing progress and evidence.

At the same time, the International Sustainability Standards Board (ISSB) released two new reporting standards for sustainability in 2023: IFRS S1, a sustainability reporting standard, and IFRS S2, a climate change reporting standard. The European Union has already signaled that it will be recognizing those reporting standards. And in the US, the Securities and Exchange Commission (SEC)

has issued a proposed rule change to require sustainability and GHG emissions reporting from public companies that have announced net zero commitments to their investors.

These are just a few examples of the global imperative companies face to increase transparency around their progress towards net zero carbon goals. In this context, industrial producers—in particular, energy (oil and gas), chemicals (bulk and specialty) and mineral processing companies—need to be able to report accurately, consistently and in an auditable way:

- Greenhouse gas emissions
- Carbon intensity of their products and operations
- Progress against future pledges

This level of reporting is challenging, time-consuming and expensive for companies. To a large extent, industrial organizations are still cobbling together their emissions reporting by merging complex spreadsheets created by different functional groups, different assets and different business units. As a result, they get a view into their enterprise carbon emissions only once a year, and it's an after-the-fact report with high potential for inaccuracy.

Visualizing What's Possible Through New Technology:

- Gain real-time understanding of emissions
- Prioritize and take action to reduce or avoid emissions while still optimizing profit and yield
- Share data across levels, so the whole organization is working from the same data
- Perform auditable calculations for full stakeholder transparency

Step one in any emissions avoidance transformation is to **gain a greater understanding of and view into operations, in real time.** Unleashing advanced technology that can capture, visualize and interpret from across the enterprise is the key to moving from just reporting on emissions to proactively prioritizing decisions that strategically reduce emissions while minimizing impact on profit.

Several industry-leading companies are acting tactically to improve their carbon emissions picture. Organizations in the process industries are beginning to take advantage of a new technology-powered visualization and decision-making framework—and by doing so, they're **changing emissions tracking from an annual process to a daily event.** These companies can now see where issues are in real time and take immediate action to resolve them, or even change operational plans to avoid them in the first place.

Seven Steps to Active Decision-Making


Currently, even as companies make emissions reduction a component of their business, many are challenged to truly understand their

operational data and make effective decisions around carbon mitigation. In fact, McKinsey reports that less than 10% of the data collected in facilities is actually being used to make emissions related decisions.¹

In short, companies are deciding how to reduce carbon and where to invest without the analytical tools that can provide:

- A detailed understanding of how much carbon is being emitted
- The capital and operating impacts of making changes
- Ranked options for balancing emissions with yield and profit

To achieve a state of active decision-making, companies need to implement a framework that enables them to optimize across multiple parameters and multiple disciplines (engineering, operations, compliance, executive)—with a particular focus on balancing profit with decarbonization.



Faster, better operational decision-making can help companies achieve 15-20% of emission reduction potential.

Advanced technology offers a seven-step roadmap that can quickly transform the emissions management function:

- 1. Mobilize existing data to calculate emissions in real time.** The starting point is accurately collecting, validating and contextualizing information on fuel use and electricity use, as well as any real monitoring data available. Advanced data and analytics technology solutions can bring this data into view instantly and ensure that it is consistent across the enterprise. The mass balance approach is state-of-the-art for both downstream and upstream assets.
- 2. Utilize planned emissions and profit from the planning system.** Planning systems are well established to optimize for profit, and the

most advanced tools now also provide templates for tracking carbon through the system, to predict and optimize the plan for carbon emissions. Planners can look at scenarios involving higher- or lower-carbon feedstocks and less-carbon-intensive process routes. Plans can be evaluated and compared for impact on both emissions and margin.

- 3. Map actual to plan, evaluate gaps and prioritize options.** With these pieces in place, companies can look at the plan versus the actual on a real-time basis—and visualize it for all levels of the organization. A dashboard can highlight impacted units and systems in a plant, with a flashing icon to indicate which of them is not operating within the emissions avoidance plan.

Visual Interface Provides Insight from Data, Models and Industrial AI



4. Target emissions management KPIs by region and company.

Every organization has specific targets that they must create a plan against and keep metrics on. Calculations and rules can vary by country, province or state, and there are also internal carbon pricing rules. Emissions management and visualization technology can be customized to reflect each company's parameters—giving them the ability to track actual emissions, carbon intensity by product, biofeedstock content and performance against specific emissions allowances.

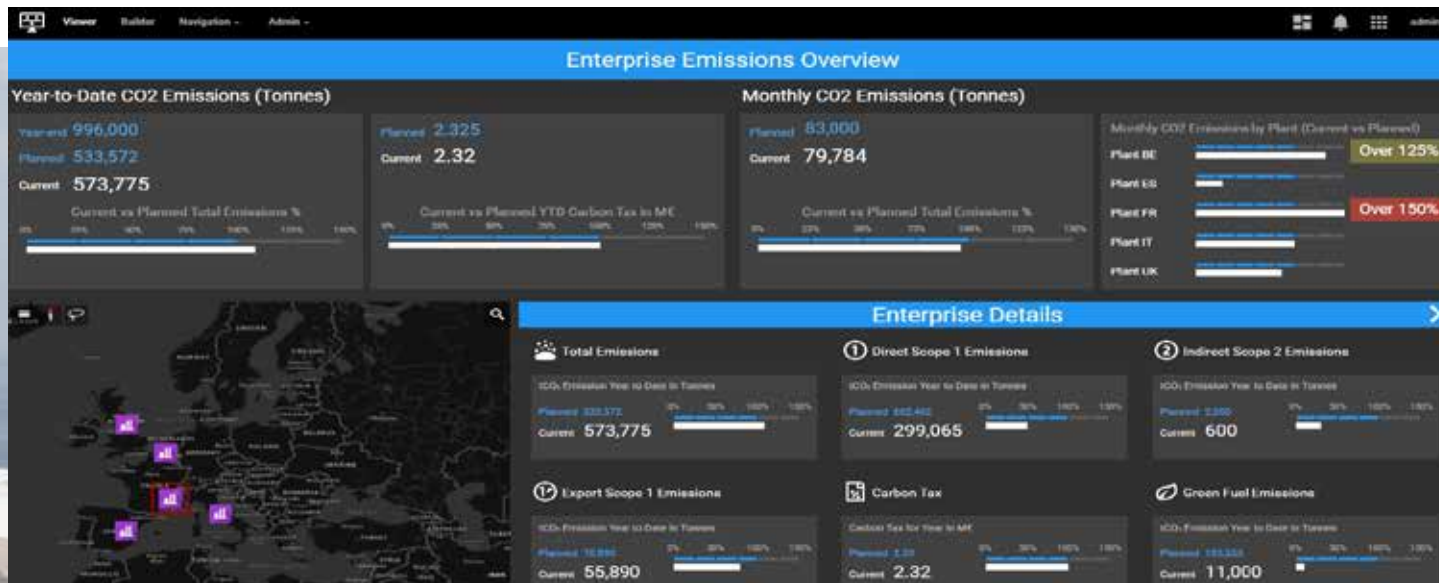
5. Gain a deep understanding of operational flexibility and benchmark performance.

Using plant data to calibrate rigorous hybrid models, operators will leverage AI to continuously adjust the models to how the unit is actually running—and tune the model to be accurate in predictively modeling carbon emissions. These models also provide a true representation of what's achievable in terms of emissions reduction, giving decision-makers accurate data to set benchmarks against.

6. **Optimize energy usage and emissions with utilities insight.** With energy use being the largest contributor to emissions, it's critical to use models when making operations decisions on electricity, steam and fuel. Using a utilities model can help operators find the best way to use utilities and generate optimal results—and the contribution of renewable power to the utility mix can be tracked and included in the decision-making process.

7. **Generate auditable results.** Transparency is critical in today's environment, as regulators—both governmental and financial—are demanding to verify emissions reporting. A system that enables outside auditors to review emissions data is essential to track and prove progress on emissions management goals.

This is what the ideal end state will look like when an advanced decision management framework is implemented. But where do companies start? The good news is, much of the necessary data collection infrastructure is already in place.



Mobilizing Existing Data to Create Impact

The elegance and utility of today's technology is that it takes advantage of all the different measurement and data systems that companies have already invested in, and it rolls all their process information and emissions data up into a single, easy-to-use dashboard.

Companies that are currently filling in spreadsheets to track emissions and energy use can now move to an advanced, real-time visualization, including features like a geographic view across the whole network and a logical process flow diagram view. Given the multitude of units that typically make up a company's portfolio, this is a game-changing advancement for businesses in the process industries.

By mobilizing the data available from all the different systems that are running in each plant, this new technology framework enables teams across the organization to understand their mission at a detailed level—and the concurrent actions of other players—and ensures the tools

being used are synchronized and that everyone is working from the same data and toward the same outcome.

In addition, all the data is packaged and presented at a high level in a way that anyone in the organization can absorb. By simplifying and organizing the important data, this technology empowers the broader organization to understand what is happening and take action if needed.

This is a digital solution that takes advantage of existing information, enabling operators to:

- Calculate carbon and know the emissions profile in advance of external stakeholders
- Understand alternatives, rank options for carbon reduction and take action faster and impactfully
- Find areas to trade off carbon emissions and profit
- Deliver everything at a solution layer to the decision-making functions (that is, determine where money would be most effectively spent)



Technology in Action: Saras Case Study

The Italian refiner Saras is implementing this solution to enable a CO₂ decision support system throughout its enterprise, moving from a yearly report to a day-to-day view of carbon emissions and plan versus actual.

By implementing detailed, customizable and interactive decision support visualization to track emissions, the company has given all levels of the organization a tool to monitor the reduction of CO₂—showing current versus planned emissions by enterprise, site and unit with a daily granularity.

For Saras, this technology provides:

- A high-level overview of key metrics for Management
- Detailed screens for Operations to compare performance against target at the single-unit level
- Insight for Planning teams to keep emissions under control, make decisions or adjustments when necessary and find opportunities to improve the plan
- More accurate mass balance models to calculate energy and emissions
- Support for CO₂ emissions reporting activity and trading of emissions allowances

By integrating this technology into its operations, Saras is reducing manual effort and errors through automatic data collection and calculation—while also increasing awareness on sustainability objectives across the organization.

At a high level, management is able to monitor CO₂ costs and improve the carbon credits management process, using real-time fiscal year CO₂ projections. Planning teams can now assess opportunities to drive sustainability and reduce emissions through feedstock selection and production planning.

Conclusion

If companies are going to make good on their commitments to achieve net zero carbon, looking at emissions once a year, in an after-the fact report, is simply not a viable option. In order to make the necessary step change in carbon reduction, companies in the process industries must empower the entire organization to take action by providing daily insight into what's happening across the enterprise and unit-by-unit, how performance compares to the plan and where money can most impactfully be spent.

By compiling systems data into a single, interactive decision-support solution, with a visual, responsive dashboard that provides daily insights, leading organizations are advancing the way they do business. They're making a true impact in emissions management and avoidance while also protecting profit.

Instead of relying on a reactive approach, companies can proactively use their sustainability strategies as a competitive advantage. With these tools in place, sustainability and profitability can be simultaneously maximized, achieving significantly better results for the company, its investors, its employees and the environment.

Go From	To
Annual reporting	Daily insight into emissions management performance
Shared spreadsheets	Single-view operational metrics
Unreliable data	Shared emissions and operating data across teams and levels
Inconsistent methodologies	Easy-to-audit calculations for transparency to financial markets, regulators, NGOs

Citations

¹ McKinsey & Co., *The green IT revolution: A blueprint for CIOs to combat climate change*, September 15, 2022



About AspenTech

Aspen Technology, Inc. (NASDAQ:AZPN) is a global software leader helping industries at the forefront of the world's dual challenge meet the increasing demand for resources from a rapidly growing population in a profitable and sustainable manner. AspenTech solutions address complex environments where it is critical to optimize the asset design, operation and maintenance lifecycle. Through our unique combination of deep domain expertise and innovation, customers in capital-intensive industries can run their assets safer, greener, longer and faster to improve their profitability and operational excellence.

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