

EMISSIONS REPORTING / SOLUTION USE CASE

Emissions Insights and Reporting

Emissions figures you can explain, check and sign off

Many plants already estimate their emissions with a Predictive Emissions Monitoring System (PEMS). PEMS calculates emissions from operating data, such as load and fuel flow, instead of measuring them in the exhaust. The Propel Group's approach puts those estimates, including NOx and CO2e where available, alongside the context that explains them. Environmental and engineering teams can then see why emissions have changed, prepare their reports with greater confidence, and compare how different operating regimes might affect emissions in future.

GOING DEEPER

A data-quality, reporting and planning layer around an existing third-party PEMS, integrating historian, fuel, load, ambient and maintenance data.

THE VALUE CASE AT A GLANCE

The problem

PEMS gives you a number. Explaining why it has changed, and preparing the report, still depends on manual intervention and analysis.

The value

Reports that take less time to prepare and are easier to check, and earlier warning when emissions change.

Extra value, at little or no extra cost

Contextualised emissions are a valuable condition monitoring signal; they can be a leading indicator of equipment degradation, which informs operating risk and helps with maintenance planning.

Why Propel

We understand turbines, permits and emissions reporting, as well as the software. Reported figures are always calculated by fixed rules that can be checked, never by AI.



Concept illustration created for this use case; not a photograph of a customer's site.

A number on its own isn't enough

To explain why an emissions figure has changed, you need to know the load, the fuel, the weather, the equipment's maintenance history and the limits that apply. When those records are kept in different places, people have to piece them together by hand, and the work depends on the few who know where to look.

This use case brings those records together around the PEMS you already have. The PEMS and its methods remain the property of its supplier; Propel doesn't change them. Our work is everything around it: checking and visualising the data, explaining changes, preparing the report and planning ahead.



THE APPROACH

How it works

The starting point is the PEMS model output. The views for engineers and asset managers use the same single source of truth.

THE OPERATIONAL THREAD

**Connect**

PEMS and plant data

**Visualise**

Data and operating context

**Explain**

Changes and follow-up

**Review**

Reports and forecasts

01

Bring the plant records together

The PEMS estimates, and the PEMS's own checks on whether each reading is valid, are read alongside plant data, fuel use, load, weather, maintenance records and equipment details. Equipment names and time periods are matched up. Each result keeps its units, reference conditions and the version of the permit or monitoring plan it relates to.

GOING DEEPER

PEMS outputs and validity flags integrated with historian, fuel, load, ambient, maintenance and asset data, with asset mapping, timestamp alignment and permit-version tagging.

02

Show emissions in their operating context

The PEMS model already checks the quality of its own input data. Propel's part is to bring together the accessible data that relate to emissions and present them visually, so users can see what is happening at a glance. Screens show each unit's current operating status alongside its emissions, and compare it with identical sister units running in the same environment. A unit that starts to drift away from the pack stands out early, and can be passed to a named person to look into, with its operating and maintenance history alongside.

GOING DEEPER

PEMS outputs collated with operating, ambient and maintenance data on a common timeline; situational-awareness dashboards with like-for-like benchmarking of sister units, and case routing to owners.

03

Prepare a report you can check

Reported figures are calculated by fixed, documented methods. The agreed tables and approved wording are filled in with checked values. Gaps, and any approved substitute values, are clearly marked. The source data and method versions are kept, and every review and sign-off is recorded. A person always approves the final report.

GOING DEEPER

A deterministic, versioned reporting engine populating structured templates; generative AI does not calculate or create regulatory figures.

04

Look ahead, kept separate from the report

The planning view uses past patterns, planned load, maintenance plans and weather assumptions to estimate future emissions. It gives a range rather than a single figure, warns when conditions are outside past experience, and later compares its estimates with what actually happened. The team can compare options such as which turbine to run, how to share load and when to schedule maintenance.

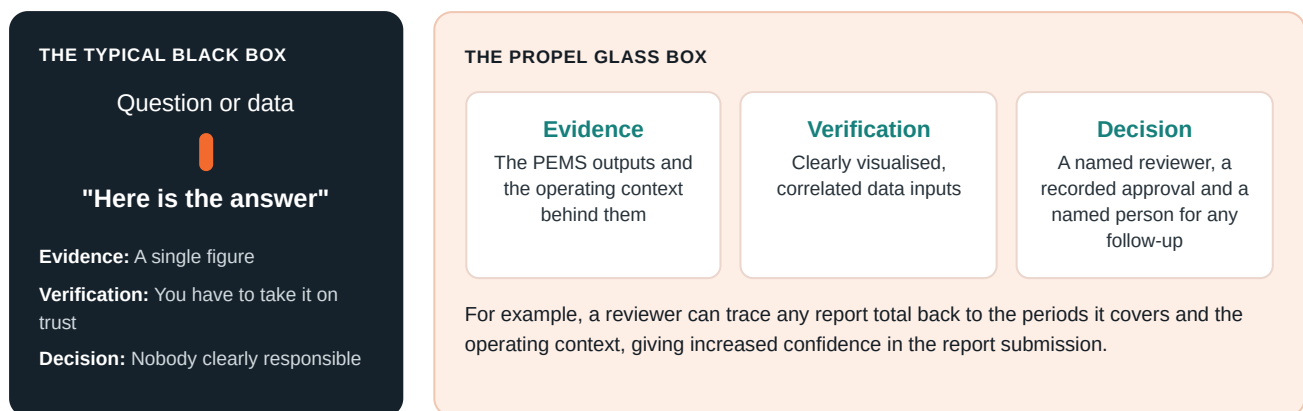
GOING DEEPER

Statistical and machine-learning models of observed relationships, back-tested on later periods, with uncertainty ranges and applicability limits.

TECHNOLOGY AND TRUST

Black box or glass box?

A system you can't see inside might simply report that emissions are rising. Propel's approach shows the period concerned, the operating context, and the drivers for changes in expected emissions. Predicted emissions are always labelled as estimates.



THE TECHNOLOGY, IN PLAIN TERMS

WHAT IT DOES

Linking plant records

Time-series and asset integration

Reads from existing plant data and maintenance systems, matches up equipment and time periods, and keeps the data-quality checks, so engineers and managers are looking at the same figures.

Fixed reporting rules

Deterministic reporting engine

Version-controlled rules set how figures are totalled, which units and reference conditions apply, and how approved gaps are handled. AI is never used to calculate the regulated figures.

Checks and follow-up

Rules, trends and action workflow

Simple checks pick up data problems and changes that need looking into. Each one is passed, with its supporting records, to a named person through your existing action system.

Planning models

Statistical and machine-learning models

Learn from past operating conditions and are tested against later periods. The assumptions, the uncertainty and the limits of each model are shown. A pattern in the data does not prove what caused it.

Note: fixed calculations make the process repeatable, but they don't turn a PEMS estimate into a direct measurement. What can be reported, and how gaps are handled, depends on the approved methods, the permit and the monitoring plan for each installation.

THE USER EXPERIENCE

One source of truth with a view for each role

The environmental adviser needs a report that is ready and can be checked. Engineers need to know what was happening on the plant when emissions changed. Asset managers need to understand operating risk and potential future outcomes. All three use the same data.

The same records, used in two separate ways

HOW REPORTING AND PLANNING ARE KEPT APART

PEMS estimates + plant records + approved methods

REPORTING

Checked data and fixed calculations

Approved wording, review and sign-off

PLANNING

Options and forecast ranges

Assumptions, uncertainty and testing against actual results

Forecasts never feed into the reported figures.

Illustration only. No customer data, emissions values or results are shown.

Environmental adviser

Check total emissions, averages and peaks against the relevant limits, and see how complete the data is. Open the source data and method behind any figure, then approve the report, with the approval recorded.

Equipment owner

Compare emissions with load, fuel and maintenance. Look at the periods that have been flagged and the records behind them, and follow each investigation through your existing case management system.

Asset manager

Compare operating scenarios in a clearly labelled forecast, with the assumptions, the uncertainty and the expected position against permit limits or targets shown for each.

Keep CO₂, methane and CO₂e separate.

Where the data allows, CO₂ and methane are kept separate before the figures are reconciled for reporting. A combined CO₂e figure can't be treated as CO₂ unless the breakdown and conversion factors are known. The permit and approved monitoring plan decide which data and methods can be used.

BUSINESS VALUE AND INDUSTRIAL RELEVANCE

The value for environmental and engineering teams

Propel connects a specialist emissions model to the everyday work of running the plant and reporting on it. The PEMS stays as it is. Around it, you get a clear record of how every figure was produced, a controlled way of preparing reports, and a separate view for planning ahead.

FOR THE ENVIRONMENTAL TEAM

- **Less time preparing the report.**

Checked data, calculations and approved wording come together in the same way each period, so the team spends its time on exceptions and review.

- **Easier checking.**

Every figure can be traced to its data and method versions, and the record of data quality and approvals makes it easier to explain a submission.

FOR ENGINEERS AND ASSET MANAGERS

- **Problems investigated sooner.**

A change in emissions is shown against operating conditions and maintenance history, so the person looking into it can tell a data problem from an equipment or operating problem.

- **Better decisions about the future.**

Load sharing, choice of turbine and maintenance timing can be compared with the assumptions in full view, while forecasts stay out of the reported figures.

WHERE TO START

Start with one asset and one reporting period. Confirm how the PEMS figures may be used, what data-quality checks it provides, and which reporting methods apply. Rework a past period with the environmental team, then extend to other assets and to forecasting. Agree targets, and what counts as success, against that starting point. Propel's Northstar Framework® is designed for this: agree the value first, then build the system with the people who will use it. A first working system typically takes one to two weeks, and measurable value four to eight.

Solution use case, September 2026. Based on an anonymised requirements brief. The benefits described are what the approach is designed to deliver; no measured results are reported here. thepropelgroup.com