

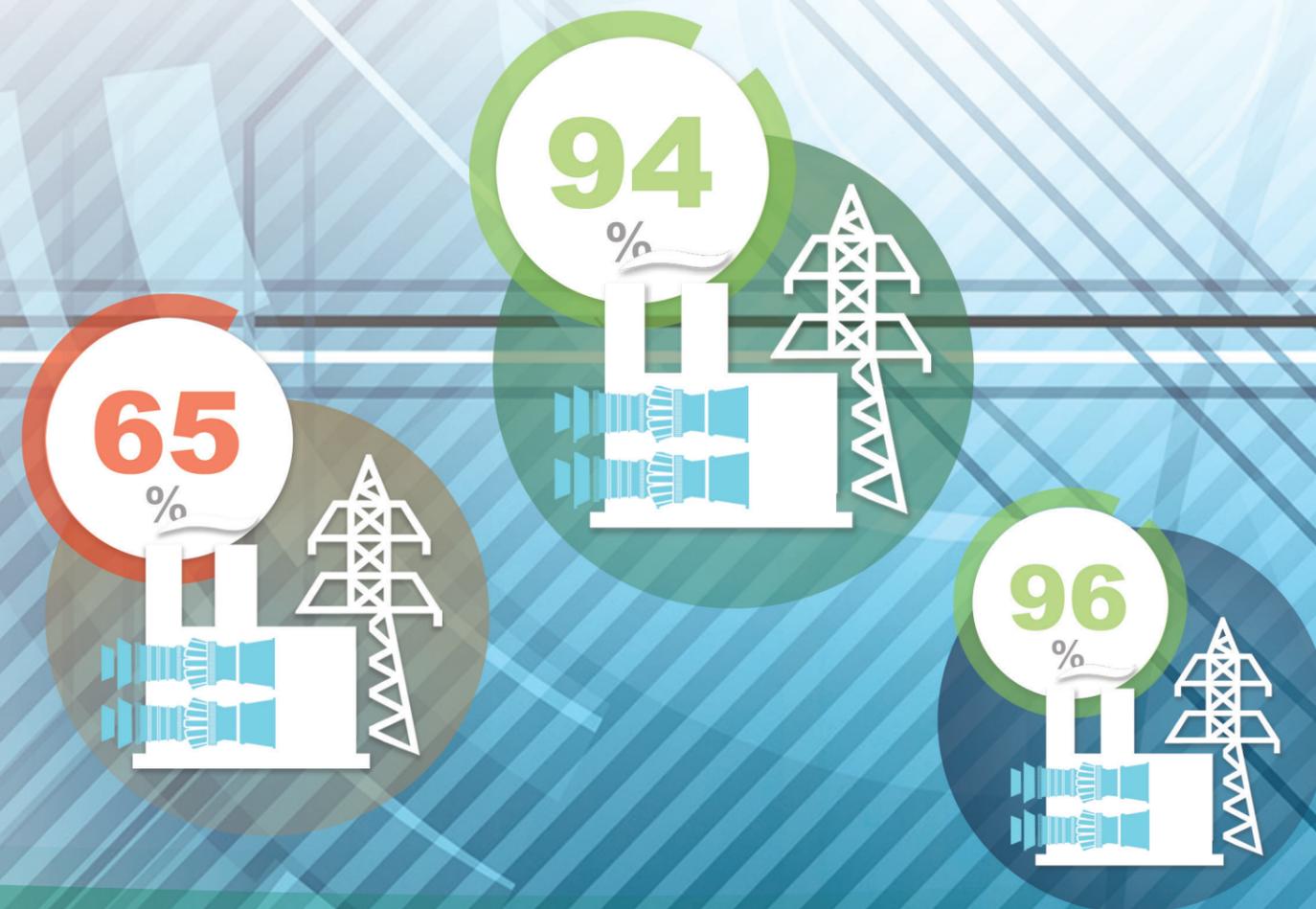
## Camfil – a global leader in air filters and clean air solutions

For more than half a century, Camfil has been helping people breathe cleaner air. As a leading manufacturer of premium clean air solutions, we provide commercial and industrial systems for air filtration and air pollution control that improve worker and equipment productivity, minimize energy use, and benefit human health and the environment. We firmly believe that the best solutions for our customers are the best solutions for our planet, too. That's why every step of the way – from design to delivery and across the product life cycle – we consider the impact of what we do on people and on the world around us. Through a fresh approach to problem-solving, innovative design, precise process control and a strong customer focus, we aim to conserve more, use less and find better ways – so we can all breathe easier.

The Camfil Group is headquartered in Stockholm, Sweden, and has 30 manufacturing sites, six R&D centres, local sales offices in 30 countries, and 4,500 employees and growing. We proudly serve and support customers in a wide variety of industries and in communities across the world. To discover how Camfil can help you to protect people, processes and the environment, visit us at [www.camfil.com](http://www.camfil.com).

## POWER EYE

### INTELLIGENT DATA TO MAXIMIZE GT PERFORMANCE AND POWER



# KNOWLEDGE IS POWER

PowerEye is an **advanced predictive analytics engine**. It helps your company understand the impact that environmental conditions, changing weather patterns, and filter status have on the health and performance of your gas turbines.

You get access to PowerEye through an annual subscription with three levels of service to fit your needs. So PowerEye is much more than just data – it's intelligence. Your program is **backed by a dedicated team of filtration specialists** who will provide actionable reports, analysis and critical insights into the status of your filters and the performance of your engines.

With all that knowledge at your fingertips, you'll have the power to maintain better control of your facilities and make strategic decisions that will **improve power output across your fleet and increase profits**.

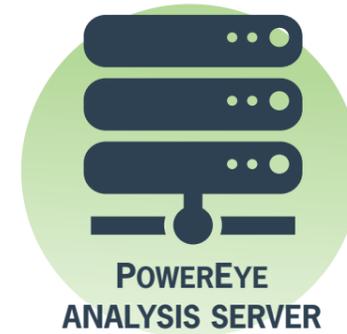
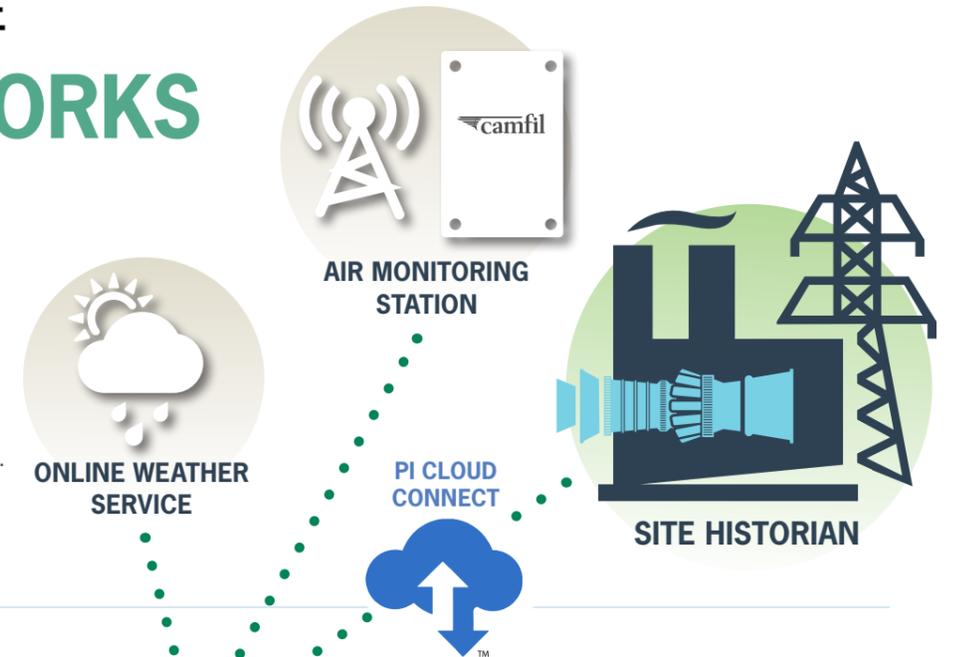


## POWER EYE HOW IT WORKS

### DATA COLLECTION

PowerEye pulls data from three main sources – the Air Monitoring Station, the facility site historian\* and an online weather service. The Air Monitoring Station is a proprietary device – provided by Camfil – that monitors temperature, humidity, pressure and dust concentration in real time. PowerEye uses engine data from the site historian – pulled from 20-40 data points.

\*Pro/Max only



### DATA TRANSMISSION

All data is transferred back to the central PowerEye Server for analysis. Intake air data from the Air Monitoring Station is sent directly via a wireless connection in the device. Engine performance data is sent from the historian via PI Cloud Connect – a hyper-secure, read-only connection. Weather data is pulled directly from an online weather service.

### ANALYSIS

Once collected in the central analysis server, all data is run through the PowerEye Predictive Analytics Engine. This engine features intelligence from Camfil's extensive filtration database – including load data on all types of filters. The PowerEye engine calculates the impact of ambient conditions and inlet filtration on the performance of your combustion turbines.



### ACTIONABLE INSIGHTS

Your PowerEye service agreement includes proactive support from a team of filtration experts. They deliver:

- Clear insights on turbine performance data
- Prediction of day-ahead power output
- Pressure drop trends
- Filter life predictions and change recommendations
- Optimal offline water wash schedules.

You can access all data and predictions through email or via a web-based dashboard with up to 25 users per facility.

The insights and predictions you get from PowerEye can save you millions in operational expenses every year.

	Lite	Pro	Max
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**FEATURES**

Real-time environment and filter monitoring <sup>1</sup>	✓	✓	✓
Power output forecast (day-ahead, hourly)	–	✓	✓
Pressure drop prediction <sup>2</sup>	✓	✓	✓
Economic optimization for filter changeout	–	✓	✓
Engine performance monitoring and alerts	–	✓	✓
Online filter efficiency test <sup>3</sup>	–	–	✓
Offline compressor water wash optimization <sup>3</sup>	–	–	✓
24/7 real-time dashboard access <sup>4</sup>	–	✓	✓

**HARDWARE**

Weather station and pressure transmitter <sup>5</sup>	✓	✓	✓
PI Cloud Connect / Edge Device	–	✓	✓
Downstream particle counter	–	–	✓

PowerEye is an integral part of our TurboConnect 360 filtration and air quality management services.

**BE ALERT**  
to increase availability

**TAKE CONTROL**  
of your productivity

**WORRY-FREE**  
operations

**FILTER MANAGEMENT**

Your maintenance teams will be able to monitor pressure drop trends and plan the timing of filter change-outs to coincide with scheduled outages. You save money on logistics and maintenance costs and – most importantly – avoid lost revenue from unplanned outages. And before you make any filter investment, PowerEye can provide hyper-accurate predictive models and life cycle costs analyses that show how different filter configurations and water wash schedules<sup>6</sup> will impact your facilities' performance and your budget.

**FLEET ASSET MAINTENANCE & MANAGEMENT**

Your gas turbine fleet is spread across many locations with different weather and environmental conditions. Each environmental condition has a different impact on the performance of the intake filters and the engines. PowerEye gives you the vision to see which locations and assets are underperforming so that you can allocate resources and take action where it will have the most impact.

**POWER OUTPUT PREDICTIONS**

PowerEye enables your facilities to predict future power output with a high degree of accuracy. Your company can make commitments and deliver power to the grid with confidence, so you meet your contractual obligations and avoid the penalties and other costs of underdelivering.

1. Lite package includes monthly reports, part of Pro/Max package dashboards.  
 2. Pro/Max offer higher accuracy for filter life estimation.  
 3. Additional features available depending on your needs. Please contact your local Camfil representative to know more.  
 4. Fleet level view for all units with PowerEye Pro/Max installation.  
 5. If needed.

6. Water wash optimization is included in Max or otherwise as an add-on.

# INSTALLATION PROCESS

## 1. Mount the Air Monitoring Station

Camfil will deliver the units for your maintenance teams to install. They should be mounted to a wall or other structure near the air inlet for each turbine with a similar elevation and orientation as the inlet and shielded from direct sunlight and precipitation.

Each Air Monitoring Station requires 110 volt to 240 volt inlet power and features two LED lights to indicate that the unit has power and is getting a signal.

The small, rectangular units weigh just 1.5 kg (3.3 lb), and once installed require no further maintenance by facility personnel.

## 2. Map out engine data from the historian

To monitor engine performance and accurately predict power output, PowerEye Pro/Max needs access to a set of site data points from the historian.

Camfil will provide a detailed list of the 20-40 data points that are required – including fuel consumption, power outputs, engine efficiencies, etc. – and work with site personnel to identify naming conventions and the units that will be used at each site.

## 3. Establish a secure connection to PowerEye

Camfil will provide your IT team with a diagram of the PowerEye Pro/Max connection architecture. This document maps out the connections that enable the flow of data from your historian to the PowerEye Analysis Server.

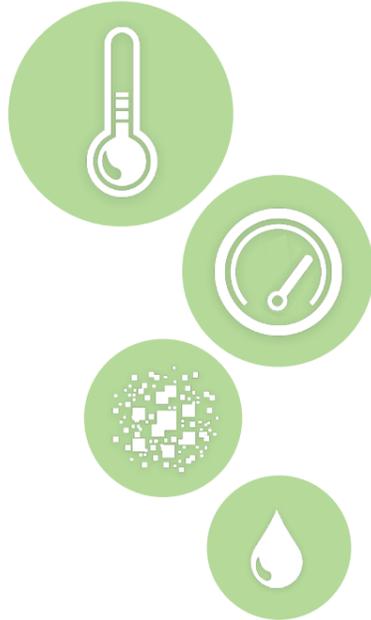
If your facility already uses OSIsoft PI, the process is very straightforward:

- You can use a PI Cloud Connect license provided by Camfil to push the tagged engine data points to Camfil
- Engine data will flow to the PowerEye Analysis Server

If your facility does not use OSIsoft PI, the process is as follows:

- Camfil will provide an on-site desktop server for your facility
- This server will have a PI system installed – with PI Cloud Connect – and interfaces needed to read data from your DCS/SCADA/historian
- Once your IT team connects the server to the internet, Camfil will configure it to collect the tagged data points from the turbines
- The on-site CPS server will then transfer that data over PI Cloud Connect to Camfil's PowerEye Analysis Server

Even though PowerEye is an advanced, powerful analytical tool, **INSTALLATION REQUIRES ONLY THREE MAIN STEPS**

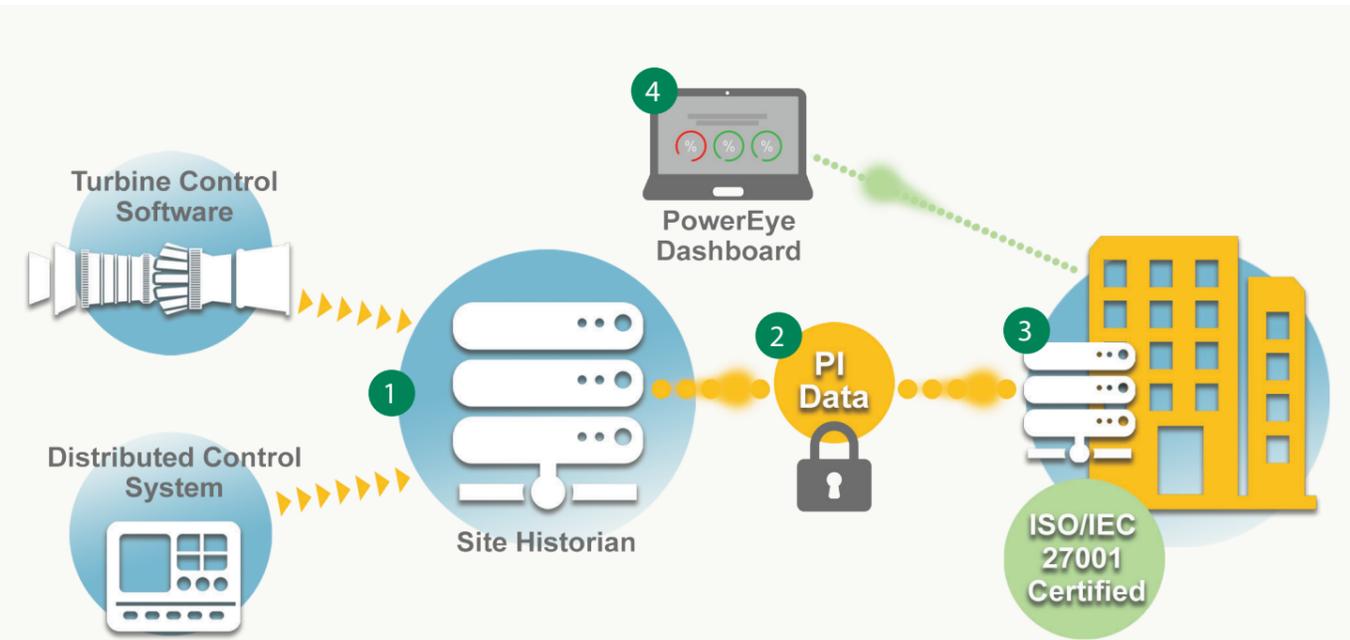


# MAXIMUM DATA SECURITY

The PowerEye connection architecture is designed to maximize the safety of your data, your equipment and your facility. No data is EVER sent directly to your operator systems in the control room – PowerEye never connects directly to any of your critical systems.

PowerEye does not use any Camfil proprietary software for data encryption or transmission.

All secure connections are established by OSIsoft PI – a system that is already vetted, used and trusted by major power generation utilities worldwide.



1. PI data is pulled from your site historian so no direct connection is established to the turbine control software or the facility control system.
2. The PI data is encrypted and sent via a read-only link so Camfil's server cannot send any data back to your system.
3. The PowerEye Server is located in a facility certified to ISO/IEC 27001 standards regarding information security management.
4. PowerEye analysis and predictions are delivered to your team via an encrypted, web-based dashboard.

Visit [www.camfil.com/PowerEye](http://www.camfil.com/PowerEye)