

User Success Story - Data-driven operation & maintenance of gas turbines

How Luminus uses Visplore for reducing downtimes, ensuring compliance and faster troubleshooting in gas-fired power generation and district heating



Luminus is the second largest energy supplier and producer in Belgium, leading the market in onshore wind and hydro power. They also operate CCGTs, OCGTs and conventional gas-fired plants for electricity and district heating. Following investments in centralized data collection (AVEVA PI) and data science teams working on algorithms, Luminus faced a gap for deeper ad-hoc analyses in daily operation and maintenance. Visplore was introduced in early 2023 to empower dozens of subject-matter-experts for faster troubleshooting, maintenance planning and process optimization.

Here are 3 examples of successful use cases.

AT A GLANCE



Empowering engineers for **self-service analytics** and **monitoring of CCGT plants**



Reducing downtimes by up to **multiple days**



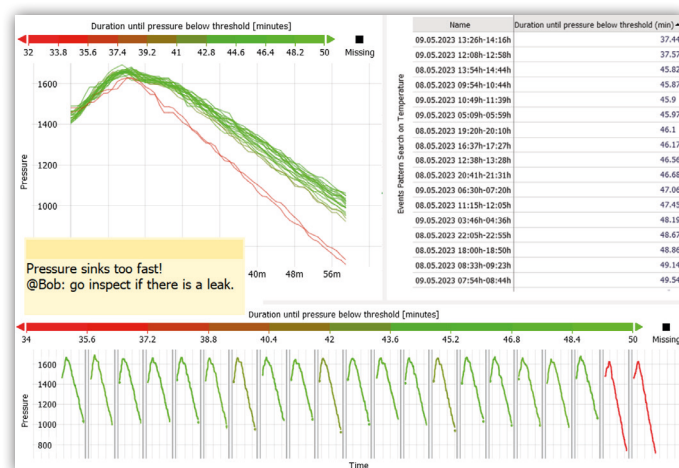
Insights for **maintenance planning, emission compliance, energy efficiency improvements & reliable heating network**

Early detection of boiler leaks to reduce downtimes

PROBLEM: Leakages in steam boilers decrease efficiency and pose a risk for downtimes. Before Visplore, leaks were noticed in the water consumption of the complete water-steamcycle. However, **localizing the leaks was only possible during planned shutdowns** by sound tests with pressurized air on all components of the boiler – a search process that could prolong downtimes by days.

SOLUTION: Visplore enabled the engineers to **monitor multiple boiler locations for leaks without performing extra tests**. The key to detection is the pressure drop rate during turbine's shutdown events. **Visplore's pattern search feature** automatically labels shutdown events, and allows comparing the current drop rate to historical references. When pressure in a boiler location drops faster than usual, it indicates a possible leak. This way, an actual leak was located in 2023.

VALUE: Scaffoldings for fixing a leak can be built while the plant is still market-ready, allowing for **better planning of the maintenance during the next planned standstill**. Every day of shortened plant downtime makes a big difference for **keeping the promised production schedule**.



“Visplore has become a key tool for our engineers operating and maintaining power generating assets, and enables data-driven decisions in much shorter time.”

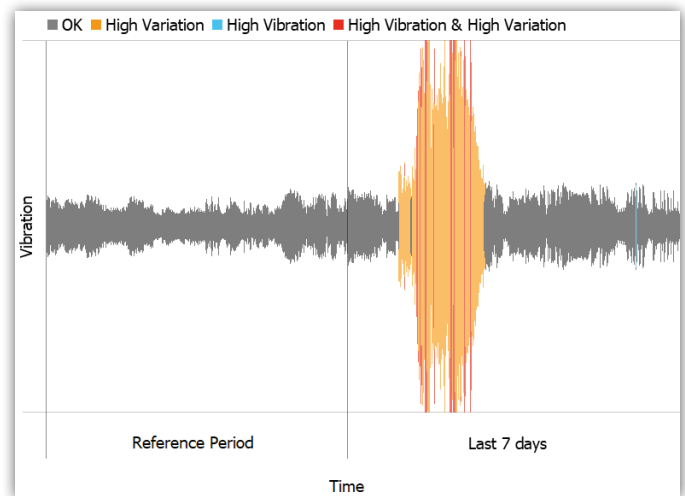
- Siebe van Hullebusch, Asset Performance Engineer

Acoustic vibration monitoring in combustion chambers to avoid mechanical damage and unplanned downtime

PROBLEM: Imbalanced burning in the combustion chambers can lead to stronger vibrations that are harmful for the combustion chamber and first turbine stage. Strong vibrations cause higher component wear, and in case of mechanical damage, can lead to significant downtimes. If vibrations get too strong, the turbine may also switch off automatically. Moreover, imbalanced burning can also increase the emissions of plants, which may trigger penalties from regulation authorities.

SOLUTION: Engineers use Visplore to **monitor vibration sensors for 18 combustion chambers in a turbine**. Deviations among chambers can pinpoint polluted gas nozzles or broken pieces that cause imbalanced burning. Deviations from historic references indicate valve control models may need to be recalibrated. Similar monitoring can be applied to flame temperature balance for emission compliance.

VALUE: Recalibrating the combustion based on data-driven insights reduces the chance of automatic shutdown events. Such events are problematic, as not-delivered power has to be purchased at high price elsewhere. **Troubleshooting with the asset manufacturer is much more efficient due to the visualizations.**

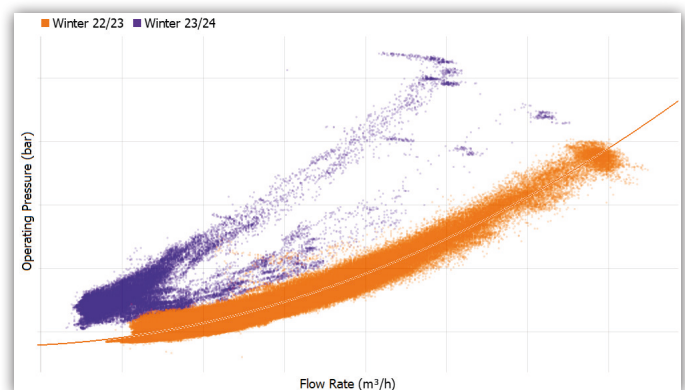


Detection of clogging in district heating pipes

PROBLEM: Blockages of district heating pipes lead to energy waste (reduced flow for the same pressure) and may result in reduced heat supply to the end-consumers. On the first cold day in winter 2023, operators at Luminus noticed unexpected lower flow in a main pipe.

SOLUTION: Visplore enabled the engineers to compare the current situation of pressure vs. flow to comparable days from the previous year, within a matter of minutes. A drift in the correlation confirmed a potential clogging, which was soon found by inspection: one of the valves had not re-opened completely after a maintenance in summer.

VALUE: Clogging can now be detected as early as possible by monitoring the correlation of flow rate and pressure in **Visplore**. This avoids complaints by the commercial sector of district heating, the city, and consumers, and ensures supply of hot water.



These examples stress how important Visplore has become in troubleshooting and data-driven operation at Luminus. In the year since Visplore's introduction, no big problem events have happened in the plant.