



Odors



Gases



Particles



Liquids



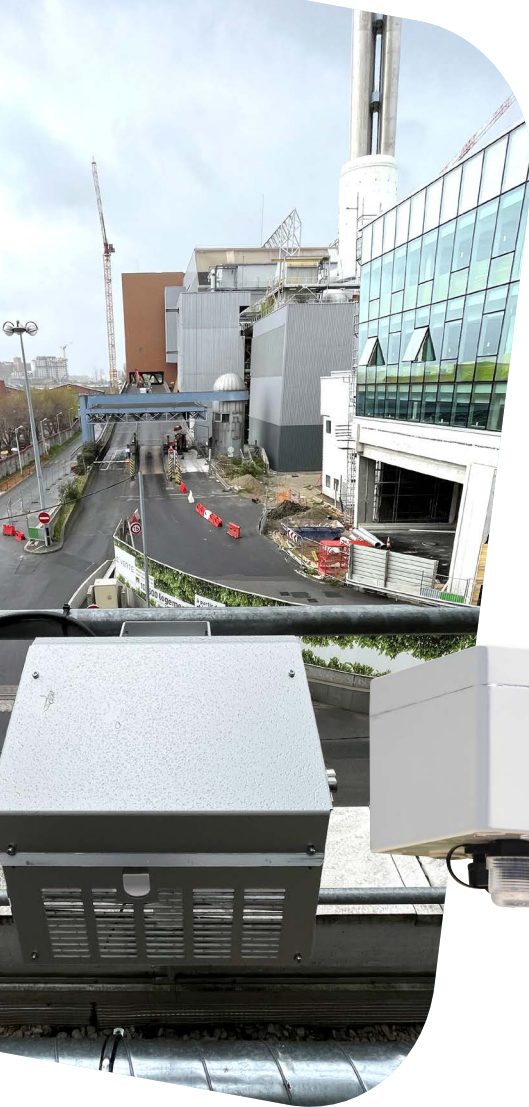
Noises

## CUSTOMER CASE

Smart odour monitoring at Sycptom's  
'L'étoile Verte' Waste to Energy plant in Paris

Enabling and improving odour mitigation  
with smart sensors and environmental  
intelligence

 **ellona**



A waste to energy (WtE) plant in northern Paris, known as the 'L'étoile Verte' or 'Green Star' waste recovery facility, which was originally built in an industrial area, is now surrounded by residential development. This has presented a number of challenges; not least of which is odour. ELLONA was therefore contracted to establish a smart continuous odour and gas monitoring network, so that the sources of odour can be identified, and improvement measures can be underpinned by scientific data.

Challenge	Solution	Benefits
<ul style="list-style-type: none"> <li>○ Monitor odour continuously</li> <li>○ Identify odour sources</li> <li>○ Identify odour-producing processes</li> <li>○ Measure effects of mitigation</li> <li>○ Reduce odour effects on local residents</li> </ul>	<ul style="list-style-type: none"> <li>○ Sample and analyse Green Star odours</li> <li>○ Configure odour monitors with appropriate sensors</li> <li>○ Build network of Ellona WT1 monitors</li> <li>○ Develop modelling for urban environment</li> <li>○ Create a fingerprint for the site's odours</li> <li>○ Correlate odour complaints with potential sources</li> </ul>	<ul style="list-style-type: none"> <li>○ Odour alerts enable rapid response</li> <li>○ Qualitative &amp; quantitative source identification</li> <li>○ 24/7 monitoring provides reassurance to residents</li> <li>○ Mitigation success is measurable</li> <li>○ Odours from external sources are identified</li> </ul>

## Customer Needs

In addition to the odour monitoring network, reports of odour occurrences by local residents help the plant to identify potential sources of odours. However, this process has a number of limitations. For example: some odour instances may go unreported, especially when they occur at night time; some odours may have been created by external sources; and odour is a subjective observation because different odours affect different people in different ways. Nevertheless, the main objective of odour management is to reduce or eliminate the effects of odour on local residents, so their feedback is essential.

Prior to the installation of the odour monitoring network, it was difficult to correlate odour complaints with potential sources, so it was clear that odour monitoring would be necessary. However, the traditional method involves the collection of spot samples, so it was determined that a continuous odour monitoring system was necessary.

*“The ELLONA monitoring network was established for a number of reasons,” says Claire Bara, Syctom Director of Urban Ecology and Environmental Regulation. “Firstly, it was clear that we would need continuous monitoring to be able to identify odour events. Secondly, air quality monitoring alone would be insufficient because of the complexity involved with odour detection and perception. Thirdly, the identification of peaks would enable us to correlate odours with specific processes and locations within the plant. So, by identifying the main sources of odour, we would be able to implement improvements that would also be monitored by the ELLONA network.”*

*“Classical modelling tools would not be able to accommodate the complexities of the urban environment, so one of the main aims of the tool was to be able to identify every odour source – both on-site and in the surrounding neighbourhood,” Claire explains.*





## Customer solution

The standard method for the determination of odour concentration (EN 13725:2022) involves the collection of a gaseous sample for dynamic olfactometry evaluation by a panel of trained human assessors. The advantage of this method is that the human nose is extremely sensitive. However, the major disadvantage, apart from the time delay and the cost, is that the gas sample represents one moment in time, so it cannot be truly representative. Continuous monitoring is therefore preferable, but only if the data are representative of the local odours.

In order to be able to monitor odour continuously, it is necessary to utilise an 'electronic nose' or IOMS (Instrumental Odour Monitoring System), with the capability to measure all of the most common odorous compounds. For this reason, the ELLONA monitors employ a suite of sensors that are capable of measuring volatile organic compounds (VOCs), sulphurous compounds such as hydrogen sulphide, mercaptans and other odorous compounds such as amines or aldehydes. The detection of specific gases, however, is not sufficient on its own, to effectively monitor odour; it is also necessary to be able to identify site-specific odours and to conduct multidimensional mapping so that sources can be identified.

Prior to the configuration of Green Star monitors, ELLONA collected representative Tedlar bag samples from the site, and conducted comprehensive laboratory and dynamic olfactometry analysis of the potentially odorous compounds present. Odour threshold limits were established using the dilution method outlined in ASTM E679. This enabled ELLONA to create a fingerprint for the site's odours and to thereby install monitors that are capable of detecting the specific odorous compounds that exist at the site.

Wind is monitored at the site continuously; not just to be able to model the movement of odour plumes but also to be able to differentiate any odours that arrive from an external source. ELLONA therefore worked in partnership with the high-performance computing and modelling company NUMTECH to model the complex air flows that take place in the plant and in the surrounding urban environment.

Ellona's WTI units store measurements internally, but the data are also transferred to the Cloud every 10 seconds for processing. Data from the physical sensors and from the virtual sensors (created from the physical sensors' data and mathematical models) provide information on air quality, odour identity, intensity and duration. The measurements and the derived odour information are provided in real-time to Sycotom via a dedicated website, which also provides the facility to view historical data.

Most of the WTI monitors are located within the local neighbourhood. This enables the evaluation of the amplitude of odour change in comparison with the reference situation. Alarm thresholds have been set for the physical and the virtual sensors, and an alert is issued each time a threshold is exceeded. Consequently, Sycotom is able to respond quickly to any odorous incident.

## Main results:

Continuous, smart odour monitoring has been shown to offer major advantages over spot sampling. However, the unique features of the ELLONA solution are that the monitoring network is developed to match the specific odours that exist at the Sycdom site, and ELLONA's mathematical models enable the continuous delivery of source identification with both qualitative and quantitative data.



The continuous odour monitoring system has improved Sycdom's understanding of the processes that affect odour, including specific events and the volume of waste being handled for example. In addition, the availability of trustworthy transparent data has provided reassurance to local residents.

Explaining the value of the insights that the ELLONA solution delivers, Claire Bara says: *"The monitoring system has confirmed the main odour sources that we have on-site. To-date, the measurement network has helped us to identify and implement the most effective mitigation measures. That work is ongoing, but we expect the system to show us that these measures have enabled odour improvement, for the benefit of our staff and local residents."*

## Other odour monitoring applications include:

**Wastewater | Landfill | Oil & Petrochem | Ports & Harbours  
Composting | Manufacturing | Food Processing  
Brewing/Distilling | Gas Production**



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#### **About ELLONA**

Our mission is to make the invisible visible, by measuring in real time gases, particles, but also noise, light or vibration, and by providing this data to citizens, employees and customers (the 3Cs). But our challenge is above all to make these data actionable in order to allow to remedy in real time these different nuisances and pollution, and to make the concerned spaces healthier and safer.

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