CASE STORY

# Capturing oil mist from the engine crankcase is a clean win for EPASA

## Retrofit of Alfa Laval PureVent 2.0, EPASA power plant

Centrais Elétricas de Paraíba, or EPASA, is the owner of two diesel power plants near João Pessoa, a coastal city at Brazil's eastern tip. With a total installed capacity of around 340 MW, the plants form one of the largest thermoelectric power facilities in the region. EPASA keeps a watchful eye on their environmental impact and operating efficiency, and this was the reason for installing 40 units of Alfa Laval PureVent 2.0. With this unique air separator, the plants have eliminated an oily environment and reduced lube oil consumption.

## Valued partnership

EPASA has four shareholders, with CPFL Energia being the majority shareholder. CPFL Energia, which has a 53.35% share, is Brazil's second-largest energy producer, bringing power to 9.9 million customers in nearly 700 municipalities.

The other large shareholder in EPASA is EBRASIL Group, which has a 41.67% share. EBRASIL Group operates six power installations across Brazil. All of them use Alfa Laval equipment, but EPASA has had a particularly close relationship with Alfa Laval since its two plants came online in 2012. The plants run their MAN engines with low-sulphur heavy fuel oil, and they have 10 Alfa Laval high-speed separators in use for fuel treatment. In addition, EPASA has signed annual service agreements with Alfa Laval for the past few years.

"We work closely with our local Alfa Laval people, and we trust Alfa Laval as a supplier of separation and thermal products," says Rodrigo Baldo, Head of Engineering at EPASA. In light of that trust, he found it natural to discuss the oily plant environment with Tiago Silva, Alfa Laval Service Sales Manager, during a routine site visit in 2015.

## Unclean air and oily surfaces

Ever since start-up, EPASA had been experiencing an oily smell in the plant environment, as well as oil residue on site buildings. The problem, Baldo knew, was mainly the result of oil mist from the engine crankcase ventilation. Blow-by gas, which enters an engine's crankcase by passing between the cylinder wall and piston ring, must be released in order to protect the engine. But when the gas is vented to atmosphere, it carries with it tiny particles and lube oil droplets of 0.2–2 µm in size.

"At EPASA, we're careful to protect the safety of our employees and the environment around our plants," says Baldo. "The oil mist was a real source of frustration for us, and we knew it could be a concern for local authorities and neighbourhoods in the immediate vicinity. But it isn't easy to deal with such small droplets in the air."

EPASA had considered the available filter technologies, as well as using a special piping construction as an oil trap. However, the company was not keen on having filter waste to dispose of, and both solutions could produce a negative impact on pressure drop and engine performance.

## A smart separation solution

Fortunately, Alfa Laval could offer a better answer. Silva presented Alfa Laval PureVent 2.0, a unique gas separator with 98–99% cleaning efficiency – specifically designed for cleaning oil and particles from crankcase gas. The gas enters the bottom of the separator and passes into a rotating disc stack, where centrifugal force presses the oil and soot out between the discs. What leaves the separator is virtually oil-free air, and the collected oil is possible to reuse for engine lubrication.

**“This project was a real win-win, combining improvements in environment and economy. We’re proud that PureVent 2.0 has lived up to EPASA’s high expectations.”**

*Pontus Bergstrom, Business Manager, Alfa Laval*

“PureVent 2.0 was an amazing contrast to the other solutions we’d been looking at,” says Baldo. “Just by installing this small unit, we could remove our oil mist problem without causing engine problems. And we could save some money on lube oil as well. It seemed almost too good to be true.”

### Examining the proof and potential

Naturally, EPASA did not take the solution at face value. Baldo and his colleagues carefully studied both the compatibility of PureVent 2.0. and its potential for savings through reclaimed lube oil.

“It became clear through the process that Alfa Laval had a lot of proof for PureVent 2.0,” Baldo says. “We saw that thousands of similar module designs had been used for the same application, all with great success. So we initiated a project to develop a plug-and-play PureVent 2.0 module for our specific needs.”

Oil mist is visibly eliminated from the moment PureVent 2.0 begins operating.

The first of 40 customized PureVent 2.0 modules, realized through cooperation between Alfa Laval, EPASA and EPASA's chosen engineering company, was delivered in August 2017.

## Less mess, less waste, less cost

Since installing the units on EPASA's MAN engines, the solution has proved its value. "PureVent 2.0 does exactly what we hoped it would do, which has made it a cornerstone of our efforts to improve the plant environment," says Baldo. "The slippery oil film is gone from the ground and from the equipment near the crankcase ventilation outlet, so EPASA employees are safer in their work. And the air is much better. There's been a real change in the plant surroundings."

PureVent 2.0 has also made a substantial contribution to plant economy. EPASA estimates that crankcase gas cleaning has saved around 12,000 kg of lube oil per year, based on the 40 diesel engines running 3000 hours per year. Added to this, EPASA has taken other strong actions to save lube oil at the plants. Looking at data from 2018, when EPASA's gross power generation was 925,398 MW (just over 30% capacity), the plants used 168,400 kg less lube oil in total.

"We can see that lube oil consumption has gone down substantially with the help of PureVent 2.0," says Baldo. "With that figured in, the total cost of ownership for these separators has been very low."

## Truly start-and-forget

Perhaps best of all, EPASA's PureVent 2.0 units practically take care of themselves. Major service is needed only every 16,000 hours or five years, whichever comes first.

"The equipment is very simple – easy to adjust and maintain," says Baldo. "Since the units are fully integrated into our supervisory system and the starting logic of the engines, there aren't any direct actions needed from the operators. The units simply run."

In fact, were it not for the cleaner environment and lube oil savings, the solution would be easy to overlook. Baldo says the best praise for PureVent 2.0 is something he once heard from EPASA's Operational Supervisor: "I didn't even remember that we had PureVent 2.0 installed at the plant."