



ELIOS 2 IN ACTION | SCRUBBER INSPECTIONS

**DRONE REDUCES TIME NEEDED  
FOR SCRUBBER INSPECTION BY  
98%/470 HOURS**

TVA TESTED THE ELIOS 2 FOR THE INSPECTION OF A SCRUBBER AT ONE OF ITS POWER PLANTS AND FOUND THAT IT HELPED KEEP PERSONNEL SAFER WHILE SIGNIFICANTLY REDUCING THE AMOUNT OF TIME REQUIRED FOR THE INSPECTION.

## BENEFITS IN A NUTSHELL

### SAFETY

Scrubber inspections typically require inspectors to use scaffolding that stands 80 feet in the air. Using a drone for remote visual data collection meant TVA personnel could avoid working at this dangerous height.

### SPEED

A manual scrubber inspection takes approximately 480 hours of work. Using a drone, TVA personnel were able to complete the inspection in just 10 hours, reducing the total time needed for the inspection by 98%, for 470 hours of work saved.

### IMPROVED MAINTENANCE

Unmanned aerial systems allow TVA employees to collect visual data without erecting scaffolding, and can be used for quick spot checks of leaks and other potential issues in the scrubbers, making it a powerful tool for improving maintenance processes.

## INTRODUCTION

The Tennessee Valley Authority (TVA) is the largest public power provider in the United States.

It provides electricity to 153 local power companies and about 60 large industrial customers and federal facilities, serving 10 million people in parts of seven southeastern states.

Since it was founded in 1933, the TVA has worked to seek innovations that help reduce prices for the power it produces while also improving safety for its employees.

As a continuation of these efforts, the TVA began investigating the use of drone technology to support its operations a few years ago, conducting tests for different applications in the hopes of further improving its processes.

## CUSTOMER NEEDS

Scrubbers are a crucial part of power generation, and the TVA's operations rely on various scrubbers which are in operation at several locations at any given time.

A scrubber—known formally as a flue gas desulfurization (FGD) unit—gets its name from the

job it performs, which is to “scrub” SO<sub>2</sub> emissions from the exhaust of coal-fired power plants.

The scrubbers used by the TVA are incredibly big silos, so large they have been described as enormous caverns, which use a limestone slurry to remove sulfur dioxide from a plant's flue gas exhaust.

The spray headers inside these scrubbers must be inspected periodically to ensure that they operate properly.

To inspect the equipment, scaffolding must stand about 80 feet high inside the scrubbers, which





makes both its erection and use potentially dangerous for personnel due to the danger of falling.

Given the danger of conducting inspections inside scrubbers, they presented a compelling use case for testing drone technology to collect visual data remotely for inspection purposes.

## **SOLUTION**

James Manni, the UAS Program Manager at the TVA, decided to test the Elios 2 to inspect the Unit 2 scrubber modules located at the Cumberland Fossil Plant.

The goal of the test was to see whether the drone could successfully collect visual data and assist TVA's existing inspection program.

The Cumberland Fossil Plant's Unit 2 scrubbers are over 100 feet tall and 60 feet in diameter, presenting a huge area for inspectors to cover. Manni hoped the drone might be able to speed up the inspection process while also improving safety by removing the need for anyone to work at dangerous heights during the inspection process.



Picture captured by drone during the mission

This particular UAS was chosen for this test because of its design. The drone sits within a protective cage, which allows it to collide with objects and continue flying, and was created specifically for conducting inspections in confined, hard-to-navigate indoor spaces, such as the scrubber

presented.

## **RESULTS**

Although this was the first time anyone at the TVA had used a drone to conduct a scrubber inspection, the effort was a success.

In the very first flight the inspection team conducted they found a maintenance item within one of the scrubber's spray headers. The issue was quickly addressed, and the TVA team put a workaround in place that allowed safe operations to continue until it could be fixed during the next maintenance outage.

After discovering this issue the inspection team went on to complete the scrubber inspection. Within a period of 8-10 hours, they were able to collect all of the visual data they needed for their inspection remotely with the drone without having to erect any scaffolding.

After completing a successful inspection of the Unit 2 scrubbers, the TVA team went on to use the Elios 2 in the Unit 1 scrubbers. A fluid leak had been discovered on the outside wall, and they flew the Elios 2 inside one of the scrubbers until locating its source.

If the drone was not used the team would have had to drain the entire scrubber and set up scaffolding inside the Unit 1 scrubber, working methodically to find the cause of the leak. With the use of the drone they were able to fly 100 feet down directly from the entry point until identifying the source of the leak.

**[Watch: See the footage captured during the inspection.]**

## **BENEFITS TO USING A DRONE**

The primary value for TVA personnel in using the drone for the scrubber inspection was safety.

No one had to erect scaffolding 80 feet or more in the air, and no one had to climb scaffolding to



Picture captured by drone during the mission

conduct a visual inspection, which meant that no personnel were exposed to the hazards of working at a dangerous height and confined space.

The drone also made the scrubber inspection much faster, helping inspectors collect all of the visual data they needed in about 10 hours.

Using a traditional approach, the same inspection would have required a total of 480 hours—450 hours to put up and take down the scaffolding, and 30 hours for the inspectors to perform their visual inspection while standing on the scaffolding.

This means the use of a drone made the scrubber inspection 98% faster, for a total of 470 work hours saved.

## CONCLUSION

Since the first test in Units 1 and 2, James Manni has been back to the Cumberland Fossil Plant to provide inspection support during routine maintenance outages. Using the Elios 2, his team was quickly able to identify where the leak was

located, and they plan to return soon to inspect another spray header.

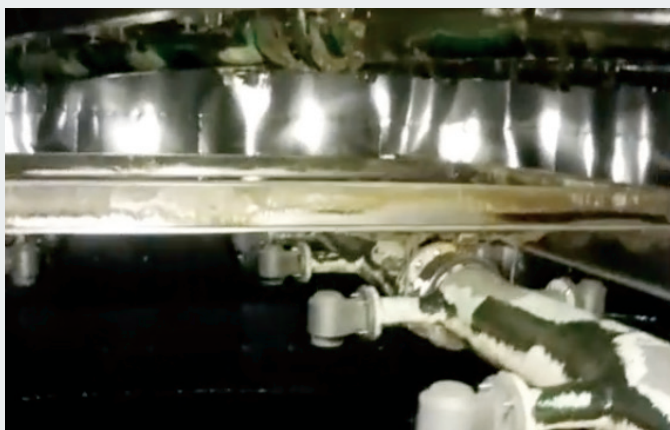
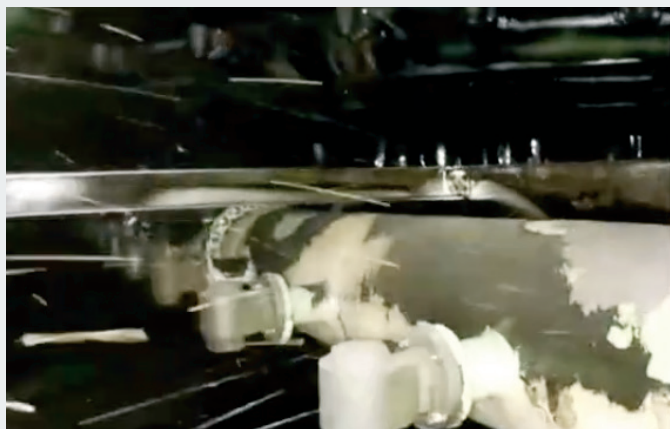
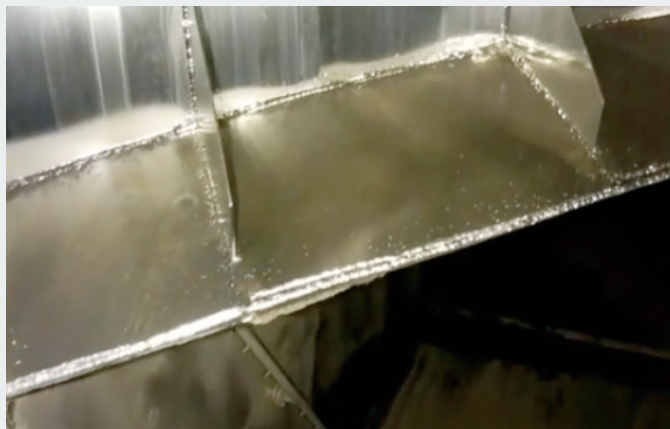
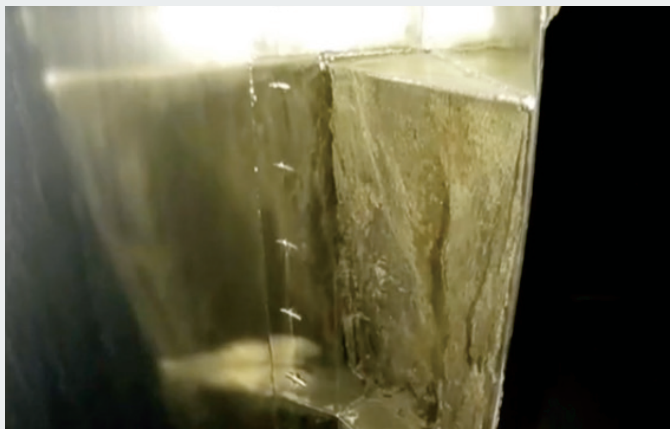
And it looks like these kinds of missions will only increase with time.

Given the short preparation needed for its use, a drone presents an efficient, convenient way for the TVA team to conduct spot-checks when potential issues arise in its scrubbers.

After the success of the scrubber test, the TVA team plans to continue using a drone to collect visual data for inspections, and is currently working to expand its drone program into other potential use cases.

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## INSPECTION PICTURES TAKEN BY ELIOS 2



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### TIME – COSTS – SAFETY

Flyability builds **safe drones for the inspection of inaccessible, confined, and complex places**. Focusing on the Energy, Oil & Gas, Chemicals & Maritime industries, Flyability enables end-users to save time, costs and reduce risks during visual inspections.