

## ENDESA LAUNCHES AN UNDERWATER ROBOT TO INSPECT AND MAINTAIN ITS PLANTS

- *The underwater vehicle, the result of the company's digitalisation process, helps minimise occupational risks in addition to reducing costs for this type of work.*
- *Developed by the Spanish start-up Nido Robotics, the robot is capable of carrying out work at a depth of up to 300 metres.*

**Madrid, 1 October 2019.-** As part of its digitalisation process, Endesa has successfully tested its new underwater robot, an ROV (remotely operated vehicle) designed to remotely inspect and perform maintenance work on its thermal generation facilities.

This small vehicle (29 x 34 x 52 cm and weighing 12.5 kg) is operated remotely and can be handled by the plant's own staff. The underwater vehicle can perform work up to a depth of 300 metres and was designed, manufactured and supplied by the Spanish start-up NIDO Robotics, following Endesa's specifications to adapt it to the underwater inspection and maintenance works required for a plant.

The underwater vehicle offers the following advantages:

- Minimises occupational risks to the company's staff or third-party personnel, as it completely or partially avoids having to use an underwater crew to carry out inspection and maintenance works.
- Reduces costs from previous underwater tasks as there is no need to subcontract underwater teams that need to travel to the power plants.
- Optimises the response time for the analysis and possible resolution of incidents in assets that are not accessible due to being fully or partially submerged.



*Introduction of the robot into seawater pump inlet channels*



*Guiding the vehicle using virtual reality goggles while an observer checks the screen*

So far, the vehicle has been successfully tested in three different power stations. Specifically, in the Carboneras coal-fired thermal plant and port terminal in Almería; in the San Adrián del Besós combined cycle in Barcelona; and in the Melilla diesel power station.

In addition to taking images, the vehicle has also carried out cleaning work on metal elements through cavitation and has taken samples of water and mud, among other activities. The vehicle has a robotic arm that allows objects found on the seabed to be handled and transported. It is also equipped with a dredging system to clean and extract mud in basins, tanks and pipes.

The tests performed have demonstrated the vehicle's ease of operation and handling, as it only requires a brief training course of no more than 1 or 2 days. The quality of the images and the results obtained are a significant help for its use in planned or special inspections as support for technologists or maintenance personnel that can also be extrapolated to other types of installations. In addition, the other systems (positioning, measurement of water properties and bathymetric survey) allow for the regular monitoring of the boundary and environmental conditions in the power stations, which makes it possible to assess the sedimentation of materials in hoppers or similar containers or to analyse the evolution of temperatures in a similar system, among other functions. With all of these parameters, maintenance plans can be optimised in the plants to adapt them to actual needs.

In addition, the ROV has proven to be useful in a variety of elements and spaces present in many industrial facilities (beyond the energy sector), such as:

- Cooling towers and tower basins: the condition of the walls, checking fallen materials, sediments, plant matter, etc.



- Water outlets and pumps: the condition of sewage pipes and the cleanliness of the grilles.
- Lakes: monitoring pH, temperature, oxygen, etc.
- Leachate basins: currents to dumps.
- Wells, canals and water pipes: monitoring cracks.
- Tanks: monitoring the condition of the internal paint, the overall condition and sediment.

This initiative is yet another example of Endesa's commitment to the digitalisation of processes, in line with the strategy followed by the Enel Group, of which the company is a part. State-of-the-art technology is being applied in this digitalisation process, allowing for the digital transformation of industrial assets, the customer relationship and the improvement of the company's digital capacity. All of this, with efficient management of hazards associated with cybersecurity, substantial improvement of processes and new cost savings.