

# CHES – the 24/7 Chemistry Supervision Service

## Preventing damage through remote water-steam chemistry supervision

Chemistry deviations in the water-steam cycle can cause significant damage. They often go unnoticed or are not properly addressed, leading to unplanned outages and high costs. CHES, ENGIE Laborelec's CHEMistry Supervision Service, supports plant operators by identifying potential chemistry issues before they can do serious damage, and provides expert advice on remediation and prevention.

### WHY

#### CHEMISTRY ISSUES STAYING UNDER THE RADAR

Chemistry issues are known to be involved in most boiler tube failure mechanisms, as either the main contributing factor or as catalysts in the degradation process. Sadly, these chemistry deviations stay mostly under the radar or are rarely signaled. As a result, the signs are often ignored by operators or not properly addressed. Over the long term, this could increase the plant's general corrosion rate and cause deposition phenomena to occur. It is therefore essential to assure state-of-the-art follow-up with proper expert guidance.

### WHAT

#### SIGNALING AND ADDRESSING CHEMISTRY ISSUES

CHES helps power plants avoid costly downtime and repair works by signaling potential water-steam impurity issues whenever they occur. The service is backed by a cloud-based platform which automatically aggregates and analyzes plant DCS data, calculating chemistry KPIs and signaling deviations. ENGIE Laborelec chemistry specialists monitor these KPIs, further analyze the data where needed and provide expert advice on how to address the issues. They also give on-site support to follow up action lists, carry out actions and conduct on-the-job operator training.

## BENEFITS AND ADDED VALUE

### ♥ Proactively managing chemistry risks

ENGIE Laborelec chemistry experts deliver a continuous supervision service, remotely monitoring the water-steam cycle chemistry using intelligent digital tools. They provide proactive support in the event of a chemistry deviation. This means a more rapid response to chemistry incidents, leading to long-term improvement. Monthly chemistry KPI reporting also contributes to better risk management.

### ♥ Cost savings

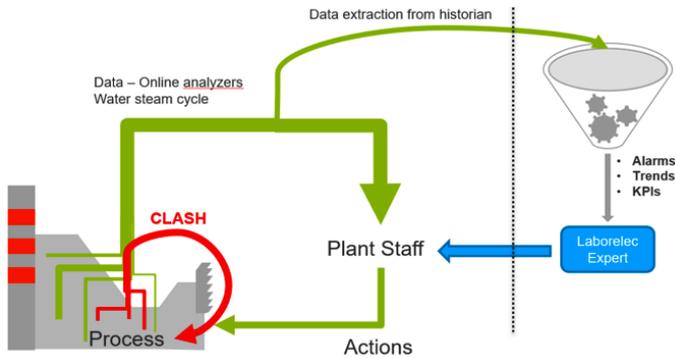
Unplanned shutdowns can cost up to €100,000 a day, while losses due to a major chemistry incident can run into the millions. Better chemistry management avoids all this. As well as preventing unplanned outages, top-class chemistry management reduces the need for chemical cleaning, generating recurrent savings of several thousand euros per year.

### ♥ Increased insight into plant chemistry status

Regular exchanges with plant operators combined with yearly on-site visits by ENGIE Laborelec experts contribute to greater understanding and awareness of chemistry-related issues by power plant staff.

# How it works

## CHESS SERVICE WORKING PRINCIPLE



Every five minutes, ENGIE Laborelec processes data from plant on-line water-steam cycle analyzers. Whenever a chemistry deviation requiring action is detected, an ENGIE Laborelec expert contacts plant operators with feedback and guidance.

CHESS uses dedicated logic and algorithms to monitor the chemistry by cross-linking the various parameters. This sets off Key Performance Indicators (KPI) assuring early detection of incidents and reporting.

CHESS also analyzes chemistry alarm levels relating to the actual plant operational mode, avoiding reacting to non-relevant alarms and offering a more efficient follow-up of plant cycling. This intelligent data processing layer is derived from experience with past plant start-ups.

The CHESH package also includes CLASH (Condenser Leakage Automatic Shutdown), which avoids severe damage by assuring an automated trip in the event of a major condenser leakage. CLASH implementation is tailored to the individual power plant, using selected online analyzer threshold values to ensure that the condenser leakage indicator is fully reliable. This indicator is used to trigger the trip signal in the DCS.

## HOW DO WE IMPLEMENT CHESH?

CHESS can be put into operation at any power station or power generating industrial site. The continuous remote monitoring is a three-step process:

- ✔ **Step 1:** We conduct an on-site review of the plant's water-steam circuit and define a chemistry action plan.
- ✔ **Step 2:** We support the power plant in implementing the action plan. This may include upgrading online analyzers.
- ✔ **Step 3:** We configure and implement CHESH.
- ✔ **Step 4:** We signal potential water-steam impurity issues whenever they occur.



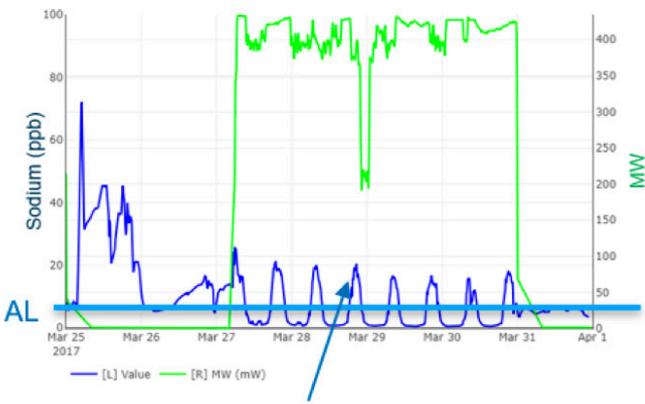
# Cases from the field

## THE RHYTHM OF THE SEA

At a power plant in France, the DCS was intermittently signaling a high sodium concentration in the water-steam cycle condensate. While increased sodium concentrations could indicate a condenser leakage, plant operators weren't alarmed in this instance because the sodium levels always came back to normal after about six hours.

ENGIE Laborelec's expert, however, analyzed the CHES KPIs. This allowed him to conclude that there was indeed a minor condenser leakage. It was the influence of the tide on water salinity that was leading to the unusual six-hour intervals. He also concluded that the salt contamination was sufficiently limited that it could be dealt with first through drum blowdown. So, he was able to advise against an immediate shutdown, allowing the leakage search to be postponed until the next planned outage.

**Costly intervention and an unplanned outage were avoided thanks to CHES.**

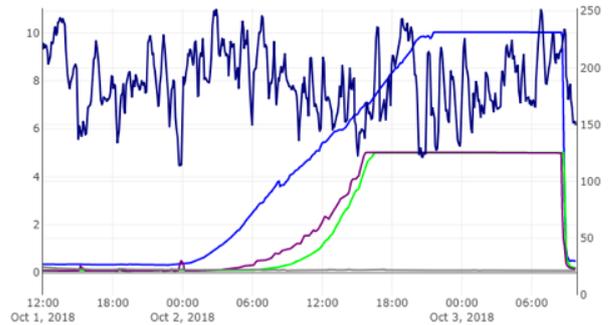


Sodium concentration

## SERVICE REVEALS MULTIPLE CONCURRENT MEASUREMENT ISSUES

An ENGIE Laborelec expert in charge of monitoring a power plant in Italy noted multiple deviations in the cation conductivity at the same time, some of them reaching alarm level 3. He cross-checked these data with other measurements, and with the CHES KPIs, and concluded that there was a **discrepancy in the measurements**, the cation conductivity measurement deviations not matching any incident pattern.

The expert advised the plant to carry out maintenance on the malfunctioning cation conductivity measuring devices, during which it was discovered that the resin column was saturated. Measurements returned to normal following corrective action.



## AVOIDING COUNTERPRODUCTIVE ACTION

The purity and treatment measurements of a power plant in Italy had rapidly increased to above alarm levels. While this would normally lead operators to open the blowdown, ENGIE Laborelec was able to demonstrate that this was the wrong action to take. **Analysis and cross-checks of the CHES KPIs revealed the nature of the contamination:** there was a problem with the caustic leaching in the production of demineralized water. This meant that any increase in the makeup water flow from the demineralization tank would have been counterproductive.

It was therefore necessary to first correct the caustic leaching problem, then drain and refill the demineralization tank, and finally open the blowdowns to evacuate the contamination. A clear example of how the CHES service helps operators to make the right decisions.





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## Five reasons for you to choose ENGIE Laborelec

- Wide range of technical competencies in Electricity Generation, Grids, and End-Use
  - Increased profitability and sustainability of your energy processes and assets
  - Unique combination of contract research and operational assistance
  - Independent advice based on certified laboratory and field analyses all over the world
  - More than 50 years of experience
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### Would you like to know more?

Don't hesitate, send us an e-mail.

**ENGIE Laborelec**

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