

Written summation
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Introduction

My name is Dr. Adnan Mansour and I am the Global Product Leader-Monitoring Solutions with GE Power and Water, Water & Process Technologies (GE Water). GE Power & Water is a \$25B business unit at the very intersection of the energy water nexus. Our suite of power generation technologies produces 25% of the world's electricity. In addition, we are a leading global supplier of water treatment, wastewater treatment and process systems solutions. Our treatment systems provide clean, safe drinking water to millions of people in water-scarce regions around the world. They also are a critical resource for helping industries minimize water usage in support of their operations.

It is privilege to share with you our water business unit's thoughts on some of the opportunities to address the energy-water nexus. At GE Water, we are focused on not only treating drinking water, industrial water and wastewater, but also reducing the amount of energy used in running and maintaining the operations of these complex water systems. Today, I am going to talk about how we are using big data and analytics to do this.

Remote Monitoring & Diagnostics

The Industrial Revolution and Internet Revolution are two waves of transformative innovation that have unequivocally shaped the modern world. It has been argued that a third wave –the Industrial Internet –is a point of convergence for the advances of the preceding revolutions. The core elements that comprise the Industrial Internet dialogue are threefold:¹

- Intelligent Machines: Connecting the world’s myriad machines, facilities, fleets and networks with advanced sensors, controls and software applications in new ways.
- Advanced Analytics: Capturing the power of analytics, predictive algorithms, automation and deep domain expertise in material science, electrical engineering and other key disciplines required to understand how machines and larger systems operate.
- People at Work: Connecting people, whether they be at work in industrial facilities, offices, hospitals or on the move, at any time to support more intelligent design, operations, maintenance as well as higher quality service and safety.

At GE Water & Process Technologies, the Industrial Internet is the process and required infrastructure to transform water system operational data into meaningful, actionable information that produces a better result over time. We do this through a secure enterprise cloud-based platform called [Water & Process InSight*](#), [a GE Predictivity Solution](#), that provides for:

- Visualizing current conditions and their trajectory
- Diagnosing problems and seeing opportunities for improvement
- Alarming on events or trends before they threaten asset production or integrity
- Reporting on key performance indicators and their impact on business objectives

All of this allows us to respond immediately to operating issues. In other words, it provides Predictivity* for performance and optimization of assets and subsequent improvements.

For example, U.S. Energy Information Administration (EIA) reports that energy usage accounts for more than 40 percent of the total operating expense for a typical refinery, excluding crude acquisition. Software and analytics simplify the visualization of the status and trajectory of key performance indicators (Fig. 1) in critical refinery water assets. Hidden cause and effect interrelationships are illuminated. Troublesome events or trends are detected at incipient stages, with speed to resolution and confidence that production operations are not compromised. The Industrial Internet provides refineries a lens to aggregate resources and

expertise to break through that next threshold of optimization that drives total cost out or contributes to sustainability.(reference GE Water article required?)

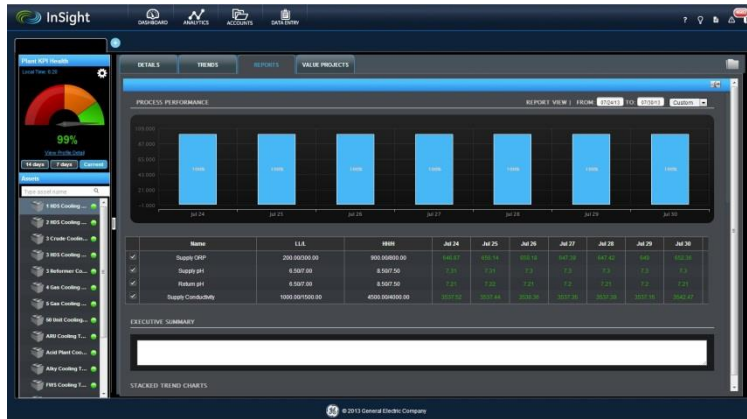


Fig 1: GE's InSight knowledge management platform uses state-of-the-art visualization techniques to help users get the maximum information they need.

Whether in refining or in other sectors, for the past several decades, industry has seen a steady stream of innovations in sensing, chemical delivery, and local automation hardware for water treatment applications and processes. These advances are and will continue to be welcome contributions to the benefit of the operators of water systems.

In Conclusion

GE Water & Process Technologies is really in the early stages of using big data and analytics to make efficiency improvements at the energy-water nexus. We are nonetheless already achieving significant operational efficiencies for our customers. Looking forward, we are on the verge of a new level of productivity and Predictivity that will drive better management of energy consumption as it relates to water treatment.

Thank you for holding this important meeting, and for the opportunity to present this information. I look forward to your questions now, and working with you over the longer term to help accomplish greater water and energy efficiencies.

References

- 1: "The Industrial Internet: Pushing the Boundaries of Minds and Machines," Peter Evans and Marco Annunziata. GE publication. November 26, 2012.
- 2: Intermediate Energy Infobook. The NEED Project, 2011. <http://www.need.org>.
- 3: "Energy Efficiency Improvement and Cost Saving Opportunities for Petroleum Refineries," Ernest Orlando, Lawrence Berkeley National Laboratory. February 2005.