Herning Vand gathers valuable knowledge with their historical data

Based in Denmark, Herning Vand strives to efficiently deliver clean water to its customers

Going Beyond Big Data

"Big Data" has become a buzzword and everyone agrees that it is worthwhile to explore the large volumes of data. Herning Vand has invested in an advanced calculator that can help to interpret their process data and already in the first project they came across particularly valuable knowledge.

> *"We have achieved some excellent results with our first project and we see a great future optimization potential with the tool."*
>
> **—Jan Ravn, Chief Operating Officer at Herning Vand**

For years, Herning Vand has recorded and saved a large amount of process data that is collected online from Herning Vand's 14 purification plants.

The data is logged with the clear intention to make Herning Vand wiser and therefore better equipped to optimize processes and the overall operations. However, for that to happen the large volumes of data must first be sorted, analyzed, processed, evaluated and thoroughly compared so that the important correlations and trends can be localized.

However, Proficy CSense shall, just like other simulation tools, be used shrewdly and Herning Vand, together with process consultants from COWI who were responsible for the initial consultancy, gained some valuable experience. COWI assists Novotek, a GE Digital partner, with process technical advice in connection with the use of Proficy CSense.

"A spreadsheet can be used to handle relatively large amounts of data, but it will not work when there are too many parameters in play simultaneously. Therefore, last spring we invested in Proficy CSense software solution, which is dedicated to finding and using mathematical correlations of large amounts of data," **— Jan Ravn**


Is there a connection?

"I see Proficy CSense as a closed box that is filled to the brim with advanced calculation routines. We just feed the box with the data we want it to compute and then we tell it what parameters we want to observe.

Proficy CSense finds the right mathematical description of the data stream and can then show two curves of the same data stream. One curve contains the actual data and illustrates the process as it was in reality. The other curve is generated by the mathematical model that Proficy CSense has set and therefore shows a simulated process.

When the program is fed with multiple data streams at once, it automatically locates the possible relationship that exist between the different data and that is exactly what we are after."

— John Sorensen, Senior Project Manager for water and wastewater at COWI.
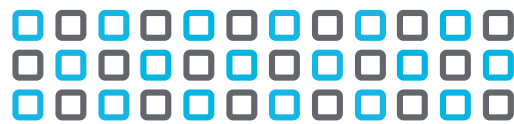
When CSense has found the mathematical models and correlations, the user can then determine which parameters to focus on and what to look out for. Just like when you insert different values into an equation. Here it is just an automated solution to an almost unlimited number of equations.
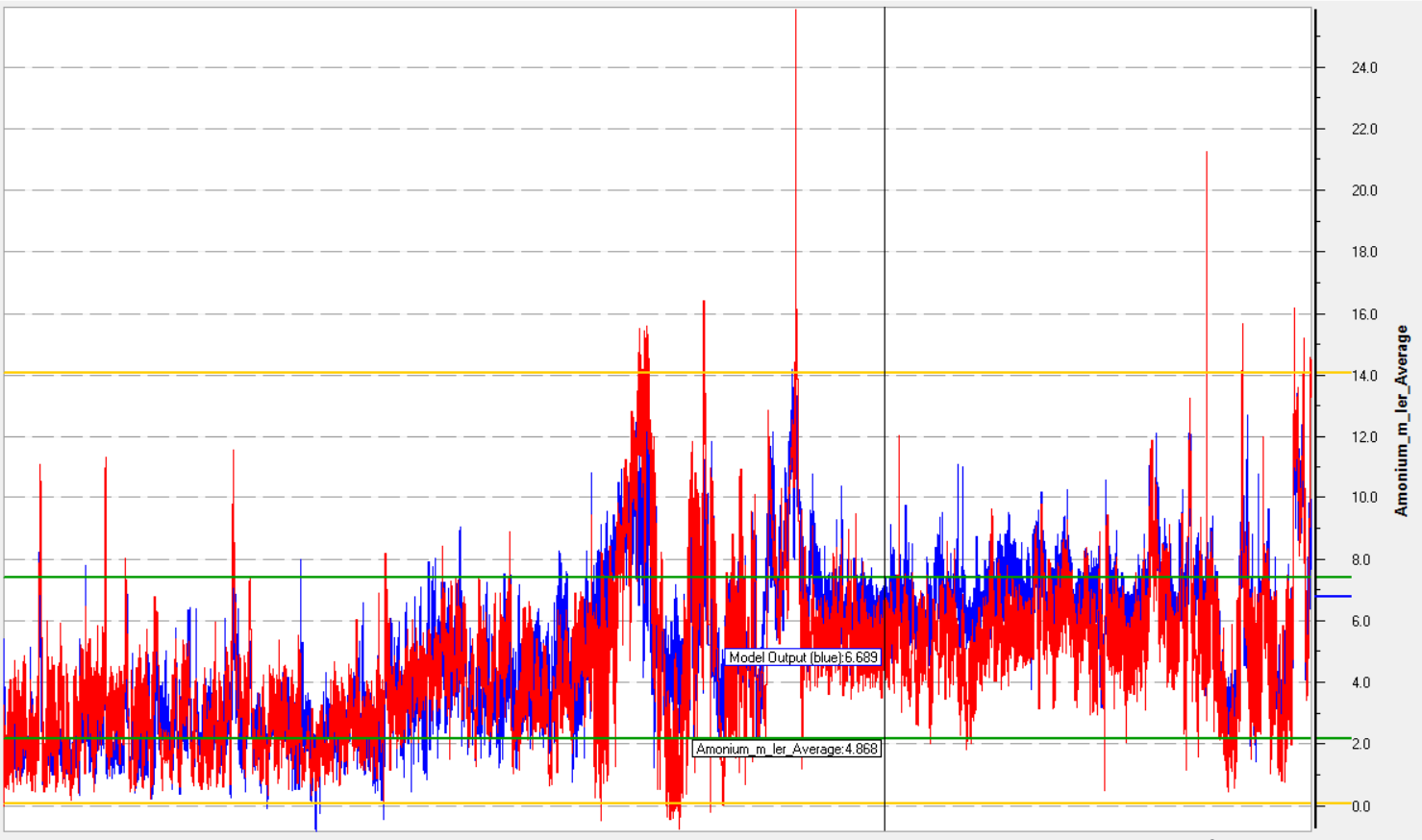

Figure 1: *Modeling of variations in ammonium concentration. Proficy CSense has generated a model where the result is shown by the blue line. The red line is the measured values.*
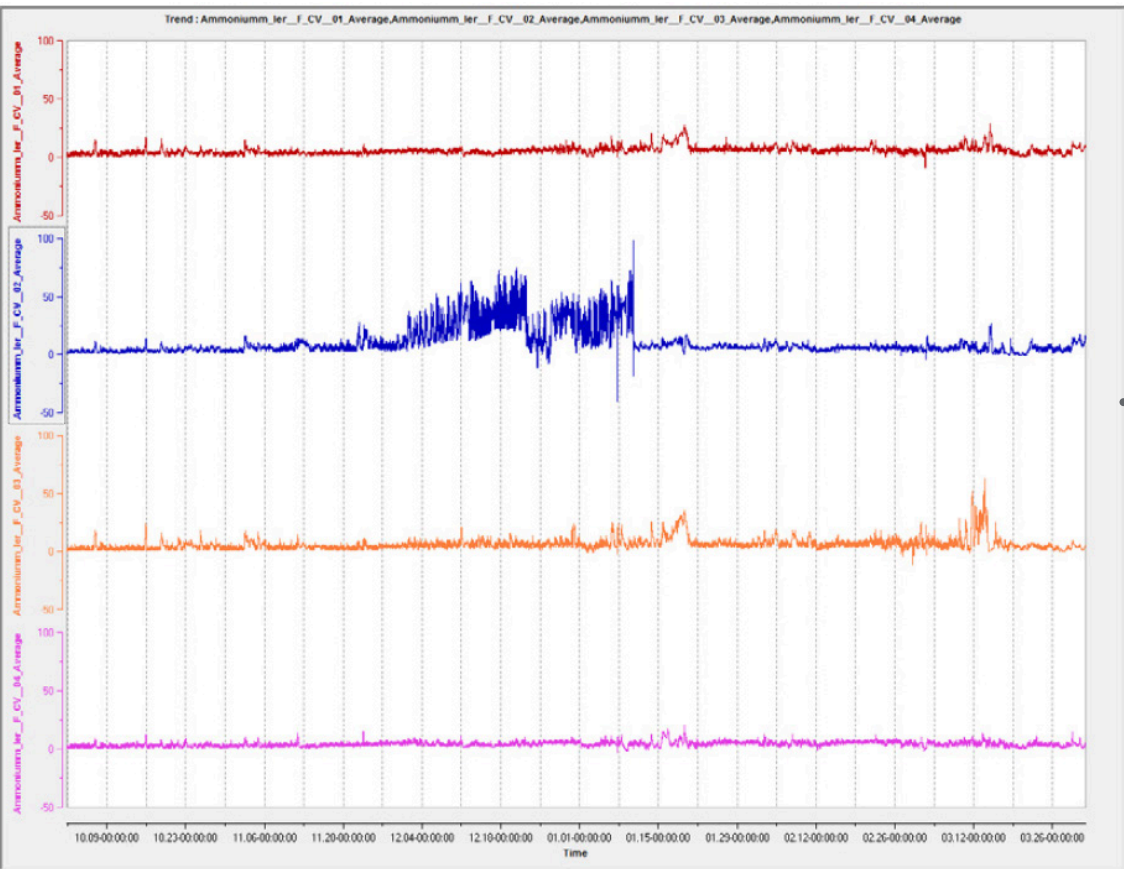

Figure 2: *Simple comparison of trend curves to get a quick overview of the situation. The figure shows the ammonium concentration in four process lines.*

"We can find correlations that we did not know existed and our theories can be confirmed or dismissed. Once we have located the significant correlations, we can begin to optimize the process based on this new knowledge,"

"If, for example, I want to have output A as high as possible, how should I then set inputs B, C and D?"
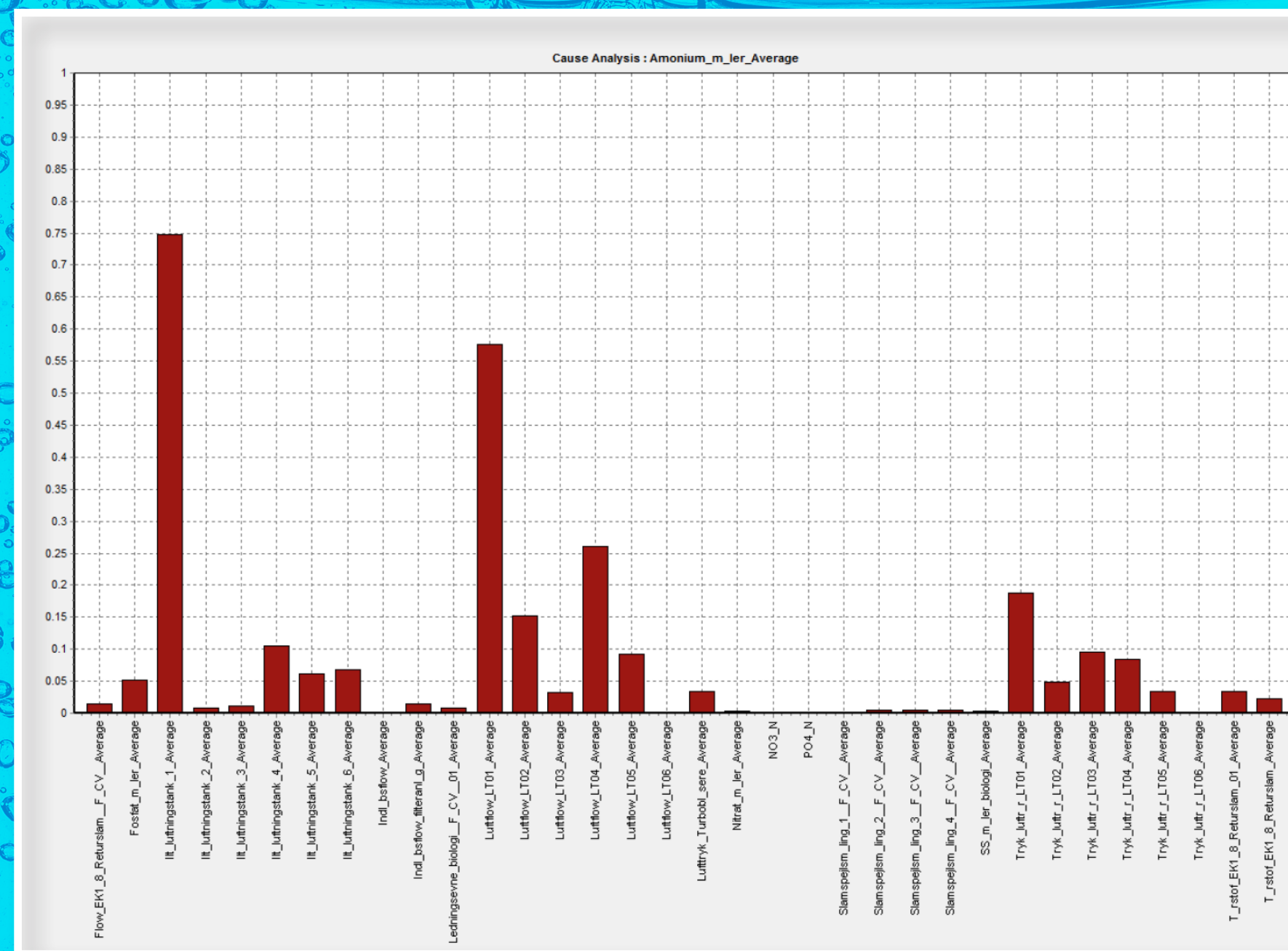
—Jan Ravn

Figure 3: *Proficy CSense has identified the parameters that have the greatest influence on a given run-off result.*

A savings of DKK 500,000

The first project, which was the optimization of the gas production that is based on sludge from the purification plants, gave an output improvement of as much as 20%.

The gas is used for electricity production and according to Jan Ravn the increase corresponds to an annual additional production of approximately 400,000 kilowatt hours, which earns Herning Vand approximately DKK 500,000.

Herning Vand is now engaged specifically in a series of small defined projects that will ultimately achieve the goal of making Herning Vand energy neutral.

"We knew roughly which buttons we had to press to achieve this gain and so CSense should not take all the glory. However, the tool makes it much easier for us to check the accuracy of our assumptions and it can also show us the way to the process-related correlations that we cannot find ourselves.

— Jan Ravn

The Art of Definition

The advice from Jan Ravn and John Sorensen is that you have to be good at defining the amount of different data that CSense works with and you get the best and fastest results if you have relatively robust process knowledge.

The more data you put in means you get more answers out at the other end. However, there is of course an upper limit,

and too many parameters in play can make it difficult to understand the results.

As Jan Ravn explained, "Our advice to new users is that you start simple and carefully consider both what it is you want to have answers to and also what parameters are likely to affect these answers. If you do not know exactly which parameters affect your focus area, you can gradually reduce the number using Proficy CSense as you test each one. When the data streams are recorded and analyzed they fit together mathematically, so when you adjust each parameter up and down with the mouse, you see how the other parameters are affected to either go up, down or remain unchanged. When you have isolated the relevant parameters there is the option to activate the tool to simulate towards an optimum process within a given framework."

Jan Ravn and John Sorensen assess the collected information.

The first project is only the tip of the iceberg in relation to what we expect to achieve with Proficy CSense. We have an ambition that the tool will be used regularly for small and large projects, and therefore assist us to pick all the low-hanging fruit that would otherwise be missed during a busy working day,"

The findings are instantaneous and the application potential is great."

— Jan Ravn

About GE

GE (NYSE: GE) is the world's Digital Industrial Company, transforming industry with software-defined machines and solutions that are connected, responsive and predictive. GE is organized around a global exchange of knowledge, the "GE Store," through which each business shares and accesses the same technology, markets, structure and intellect. Each invention further fuels innovation and application across our industrial sectors. With people, services, technology and scale, GE delivers better outcomes for customers by speaking the language of industry.

Contact Information

www.ge.com/digital