



Quantum
The Story Behind the Numbers

FAST DATA SCIENCE HELPS SWITZERLAND PLAN FOR ELECTRICITY SHORTAGES

Swissgrid warns of a potential electricity shortage in Switzerland during the winter of 2015 - Quantum empowers Swissgrid to analyse and monitor the development of the situation.

The Data Science Environment built by Quantum lets Swissgrid forecast electricity production and consumption as well as run impact scenarios to be prepared for potential shortages.

(published on Feb 1st, 2016)

Monitoring Swiss Electricity Supply and Consumption



Swissgrid owns and operates the national electricity transmission grid in Switzerland. It is responsible for the secure, reliable and cost-effective operation of the grid and for coordination and usage in the cross-border exchange of electricity in Europe.

From the Swiss Federal Government, Swissgrid has the mandate to monitor the electricity supply in the country and timely identify potential shortages. To fulfill its mission, Swissgrid turned to Quantum – and got a state-of-the-art data science environment to do just that.

First, the Swissgrid Data Science Environment collects information about electricity production and consumption, temperature observations and forecasts, water levels in reservoirs and much more.

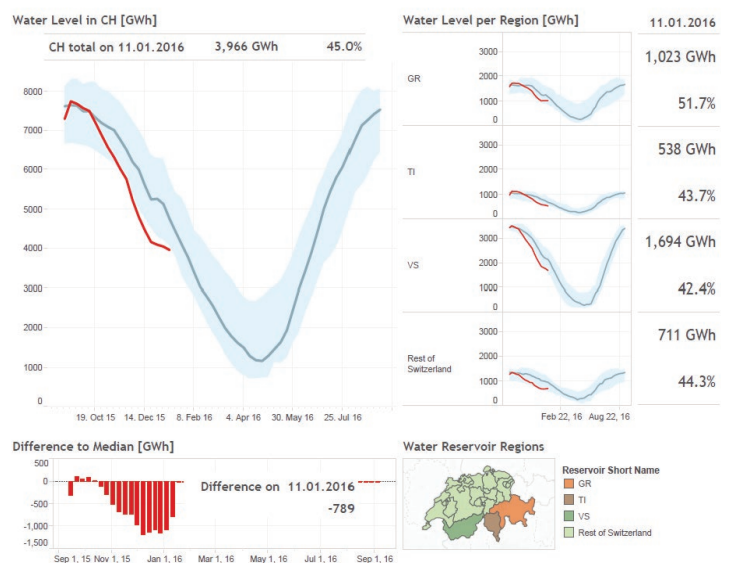
All this data is then processed and converted into a set of reports that are distributed in near-real time within Swissgrid, to external parties and to the Federal Government. In addition, extended ad-hoc analysis and simulations are made possible by a complete suite of tools integrated into the platform.

A worrying situation

The Swissgrid Data Science Environment showed its power in late 2015. The water level of storage lakes in the Alps, used for producing hydroelectricity, was at an all-time low after an exceptionally long dry spell. Unplanned urgent maintenance prevented the use of a nuclear power plant that could have provided an alternative. Import from abroad was not an option, as the necessary voltage transformation capacity was lacking. This combination could mean electricity shortages in winter, just when the need is highest.

In the top-left graph of the figure on the right, the light blue area indicates the overall minimum and maximum water levels of the last 10 years, with the median in darker blue. The actual water level of the past 13 weeks is shown in red. It is immediately evident that there is cause for concern – although the situation eased a bit over the Christmas holidays.

Figure 1. Monitoring the water levels of the Swiss lakes



Being well-prepared as a strategic advantage

In response to the potential electricity shortage, Swissgrid created a task force for assessing the possible shortfall and working out suitable measures for easing the situation. The task force makes extensive use of the Data Science Environment for monitoring the development of the situation as well as simulating various scenarios, such as the effect of a particularly cold winter or the impact of the duration of the nuclear reactors' shutdown. The Data Science Environment helps Swissgrid to plan for various potential challenges and not be caught unprepared by events. Should the situation deteriorate, information provided by the Data Science Environment helps Swissgrid and the government in deciding on measures to avoid or alleviate an electricity shortage.

There's more to do...

The scope of the Swissgrid Data Science Environment is currently being expanded to new areas, such as modelling the production of photovoltaic energy and making better forecasts for electricity consumption and production. Quantum assists Swissgrid in both the technical aspects of collecting, managing and processing data as well as in gaining new insights and business value from the data.

To get more details

Current situation (regularly updated):

<https://www.swissgrid.ch/en/home/operation/grid-data.html>

National Swiss Television news on the electricity shortage:

<http://www.srf.ch/news/wirtschaft/wie-stromkonzerne-die-gefahr-eines-blackouts-erhoeht-haben>

Measures to cope with an electricity shortage: <http://www.ostral.ch>

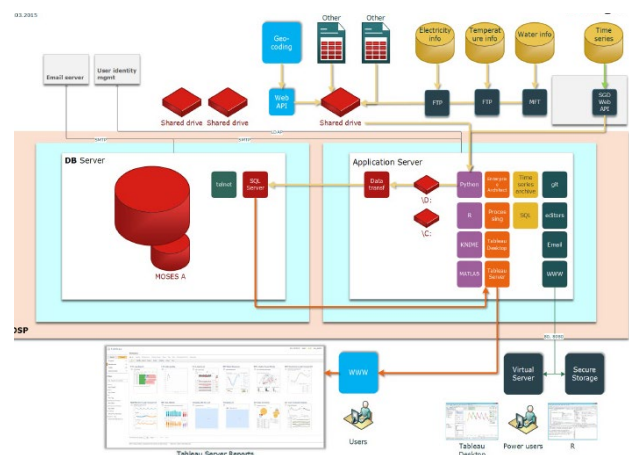
Update March 15th, 2016:

The potential risk for an electricity shortage further receded in January and February 2016. Mild temperatures, higher-than-average rainfall as well as measures implemented by Swissgrid all contributed to this. By the beginning of March, the lake levels had returned to values well within the range of the last 20 years.

The working group finished its work as planned in early March. It recommended several measures for decreasing the likelihood of an electricity shortage in the future, including optimization and increase of transformer capacity as well as various technical and market mechanisms intended to stabilize the electricity grid in extreme conditions.

Electricity consumption is normally at its highest in winter. As the winter of 2015/2016 appears to draw to a close without major disruptions, the focus is already shifting to next winter. The Swissgrid Data Science Platform proved to be a useful instrument. It is continuously developed and extended and will be more than ready to be used once again for monitoring and analyzing the electricity supply for the winter of 2016/2017.

Figure 2: Swissgrid Data Science Platform (simplified view)





About Quantum

Quantum is a data science and analytics company, located in the center of Zurich. We help clients to identify their most valuable customers, products, or services; determine potential risks; discover hidden potential in their markets; pinpoint and eliminate bottlenecks and inefficiencies; and provide other insights to steer their business. We do this by combining business experience and knowledge with the application, implementation and teaching of scientific methods of data analysis, data management, reporting and modern visualisation to turn data into information.

To learn more about how data science can help you and your business, visit our website: www.quantumanalytics.ch or send us an email to info@qbis.ch.