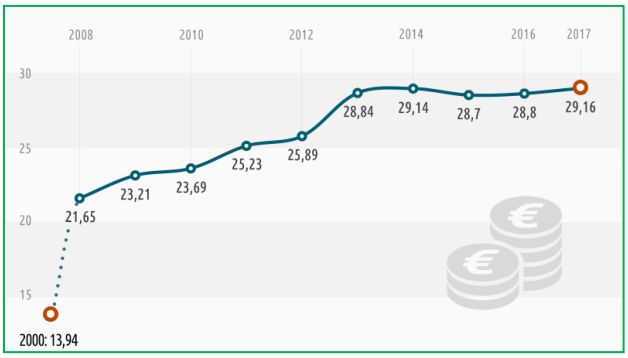
WEAM4i
Water & Energy Advanced Management For Irrigation

Possibilities of Power Saving in Extant Irrigation Networks by Using Automated Pump or Well Control



Increase of energy prices in Germany

Summary

Agriculture sector is accountable for 30% of the total water consumption in Europe, but reaches up to 70% of total water consumption in several European southern countries. In recent years, most of the efforts have been focused on water efficiency, but without taking care of energy aspects, resulting - in some cases - on a significant increase in energy consumption, combined with a scenario of increasing energy costs throughout Europe.

WEAM4i project has covered many case studies to demonstrate innovative techniques for resource efficiency at local level, decision support tools and an ICT/cloud platform for sharing weather forecast and remote sensing data services & applications.

The energy demand worldwide has been increasing together with the population growth. As a result, the energy prices have augmented affecting the irrigation sector.

In this case study, the energy situation in irrigation networks in Lower Saxony has been analysed in order to develop solutions for energy savings through **control systems for irrigation networks**.

Control systems for irrigation networks

There were two strategies used in the case study of the control systems for irrigation networks under the framework of WEAM4i project:

Strategy1: Reducing/regulating the pressure at the wellhead in irrigation networks with one well and frequency controlled pump station.

Strategy2: Switching- on the most effective wells in irrigation networks with several wells.

Challenges:

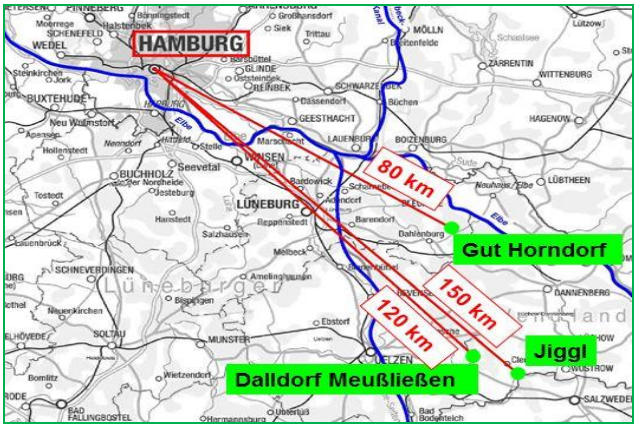
- The increasing price of electricity for irrigation.
- Management of supply infrastructure and the steering technology.
- Reduction of the energy consumption through intelligent control systems.

Description of the case study

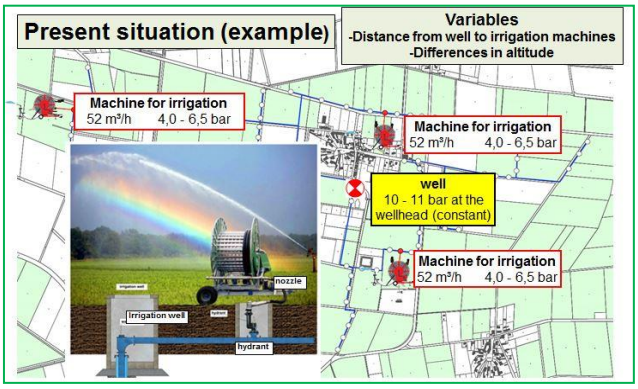
The case study covered some irrigation fields in Lower Saxony in Germany. The development of new steering systems included:

- Testing of steering technologies and programming for potentials to save energy under practical conditions.
- Registering the energy situation in irrigation networks in lower Saxony.
- Evaluating of real time online documentation

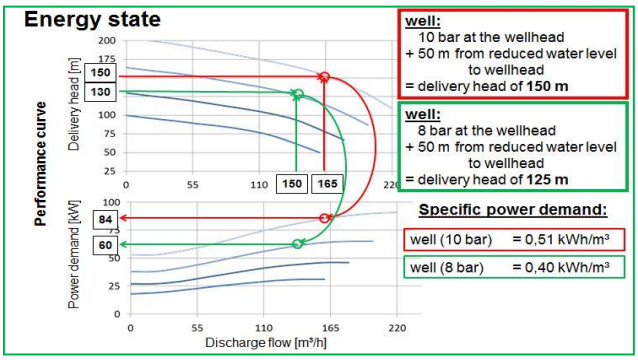
All operational modes documented continuously online and were checked for credibility.



It is a common practise to run well systems with constant pressure at the wellhead of 10 – 11 bars. In many cases, this is often not a necessary required pressure at the wellhead with less than 10 bars depending on water requirements.



During this case, a comparison of the required pump capacity for two different pressures at the wellhead took place in order to show potential of energy saving through well regulation.



Description of the solution

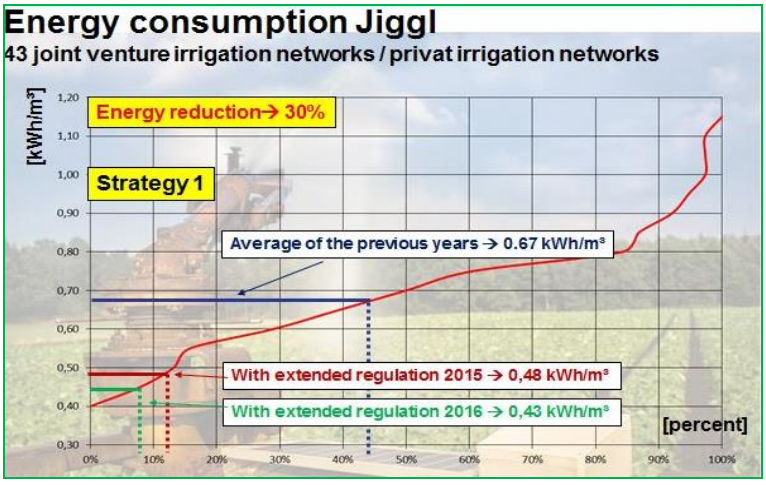
Strategy1: Reduce / regulate the pressure at the wellhead in irrigation networks with one well and frequency controlled pump station.

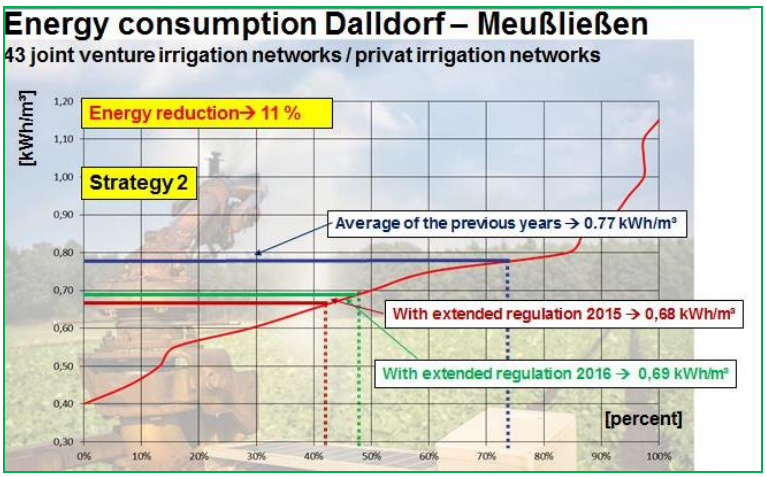
Strategy2: Switch to the most effective wells in irrigation networks with several wells depending on the number and position of the irrigation machines.

Results

- In case of Strategy 1, where the required pressure at the wellhead is often less than 10 bars, many operating states allow to reduce the pressure at the wellhead.
- In case of Strategy 2, in case of partial capacity it is not necessary to switch on all wells; many operating states allow choosing the most effective well combination.

Using both strategies, energy reductions and water savings have been achieved with high level of automation.





Learned lessons, conclusions and perspectives

1. Control strategies have to be adjusted to the network structure.

2. There is a need for transparency of the operation conditions.

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