

Pump and Reservoir Optimization

In pipeline transmission systems, the pumping costs often constitute the major part of the operating costs. In order to minimize the pumping costs, Aquis Operation includes an optional Pump and Reservoir Optimization module.



Reduces electricity consumption and CO₂ emission with 10-15%

SAVINGS AND OTHER BENEFITS:

Reduction in CO₂ emission: 10-15%
Reduction in electricity: 10-15%
Return On Investment: < 2 years

POWERED BY AQUIS:

The module uses the Aquis model
This ensures:

- Correct calculation of time delays in the network
- Correct calculation of network capacities and reservoir flexibilities, ensuring correct optimization, for example in the morning
- Optimization using fluctuating electricity prices
- Easy, quick and affordable start-up



The Aquis Operation Pump and Reservoir Optimization module enables you to determine the optimal pumping schedule for a pipeline system for a given period of time (user defined), while taking the following points into account:

- Demand schedules
- Storage capacities of reservoirs
- Power costs (unit costs may vary over time)
- Other operational costs, for instance costs for stopping and starting of pumps
- Capacity and availability of pumps and other equipment

The following dynamic input is assumed for each pipeline system as the basis for running an optimization:

- Demand vs. time = net outflow from end point terminal reservoirs
- Power unit costs vs. time for each pumping station
- Pumps not available vs. time
- Current levels in reservoirs



These data may be retrieved from the SCADA system, via the real-time data interface, or they may be entered manually.

In addition, the following static equipment data must be available:

- Volume vs. level curves for each reservoir
- Max./min. water levels of each reservoir
- Pump characteristics and power curves for each different type of pump (the module is capable of taking wear of the pump into account in the power calculations)
- Allowable area of operation of pumps, for example max./min. speed of rotation, surge limit and stonewall limit

The information above produces the following main output:

- Flow set point or pressure set point for each pumping station vs. time
- Resulting levels in reservoirs vs. time
- Costs of optimal operation vs. time

The flow set point or pressure set point for each pumping station may be sent back to the SCADA system automatically. The optimization algorithm is based on the dynamic programming technique.

