Multi-criteria decision making with Qualicision

# Optimised control of virtual power plants

**The optimal control and commercialisation of virtual power plants (VPP) poses significant challenges to the operating and sales groups of virtual power plants. Various economic and technical criteria as well as environmentally friendly energy generation can result in conflicting objectives and complex decision situations which often have to be resolved quickly or in real-time in order to operate a VPP. The decision making for prioritisation of different objectives and the realisation of the resulting optimal plant production and commercialisation requires intelligent optimisation and effective visualisation tools.**

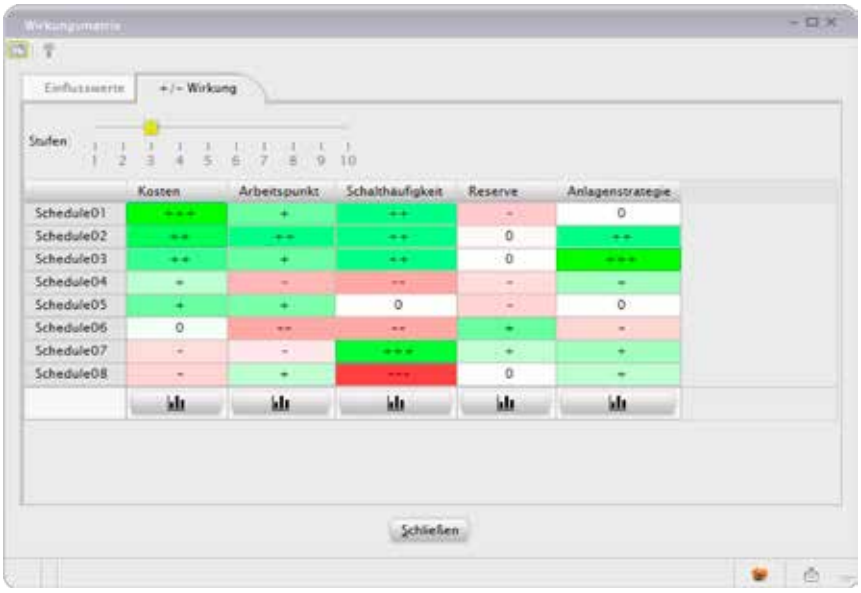
The PSI solution PSIvpp for virtual power plants integrates energy generators and consumers in the network and in the energy market. The pool controller integrated in PSIvpp monitors and controls the various energy systems which are combined into so-called pools. This requires determining the priorities for different objectives and operating strategies and their automated realisation for efficient plant operation.

## Pool optimisation calculates optimal control

The pool controller of the VPP controls the technical units (generation and consumption plants) based on the stored plant properties and the specified priorities of the technical units. The pool optimisation calculates the optimal plant control based on the plant properties, schedules, and sales surcharges for short term and control energy as well as user-defined optimisation objectives (KPI) and the current status information from the plant control.

The technology used by PSI provides easy-to-use sliders to decision makers for intuitive modification of priorities for different operating modes and strategies. The system responds to plant and communication failures by selecting and starting up other plants based on the priority list as needed.

For Qualicision-optimised business processes, the interactions are captured in impact matrices based on the process data. A mathematic conflict and compatibility analysis uses the impact matrices to determine the correct decision for achieving the process objectives as closely as possible. In technical terms, the conflict and compatibility analysis reduces the so-called combinatorial variety of control options in order to allow optimisation of the KPIs.




*Relevant values and impact matrix.*


*Overview of the effects on the utilisation of the generating plants.*

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