

How to realize the benefits - Experience from a cancelled pilot

SC B5 Protection and Automation

PS3 - Integration of intelligence on substations

Q3.05 What are your expected benefits of using digital substation concepts and how to measure if the benefits can be realized?

Anders Johnsson Sweden

Drivers for Digital Substations*

With a novel digital PACS concept that includes the use of process bus there is a possibility to reduce the life cycle cost, compared to a standard station bus solution.

The estimated savings for the costs affected amount to:

- 6-12 percent on capital expenditure for brownfield installations
- 13-19 percent for greenfield installations.

Savings are generated by:

- less area for control room buildings, use of cable PVC conduits instead of cement cable trenches, reduced number of control room cabinets, local HMI etc.

The total life cycle cost will be lower even if operational expenditures are slightly higher.

* According to paper 10804 - Novel approach to implementation of fully digital substation - Expectations on pilot project Sigtuna 130/20 kV substation

Pilot project success criteria

- Established descriptions of engineering work processes to build bus-based digital substations that covers process, bay, and station level.
- Gathered data to verify reduced lifecycle-costs for IEC 61850 PACS (CapEx). Operational expenditure costs (OpEx) cannot be verified during a pilot.
- Verified technical solution responding to DSO needs, considering even newly incoming technology and digital transformation towards a data driven DSO
- Verified specific savings due to smaller area for control room buildings, cable conduits, reduced number of control room cabinets, local HMI etc.
- Well established test and monitoring method and supporting tool set.

Pilot project Sigtuna 130/20 kV
substation terminated in January 2022

Group Discussion Meeting

Conclusions on how to realize the benefits

- Several bids received, so it is possible to specify a fully digital substation with novel technical solutions. Nothing speaks against the expected potential for the concept.
- The high ambition/scope for the project and a request for fixed prize contract made the contractors assign high amounts for perceived risks. Substantially increased the prizes.
- The choice to include a development phase was correct, considering the ambition set. An alternative where DSO runs the development activities requires more internal resources.
- Need to have frequent dialog with the market actors related to development, both prior to and during the procurement phase. Consider the roles of the market actors.
- The selection of a project with complete substation replacement into a demo site was assumed to motivate the contractors but that was actually not considered beneficial.
- Costs for testing novel technical solutions have decreased. Several suppliers have already tested many of the alternative solutions. Much less need for Real-Time-Simulator.
- The contractor responsible for the complete system sees a challenge/risk in procuring and integrating new equipment from other suppliers. Makes it less interesting for the contractor..

Group Discussion Meeting