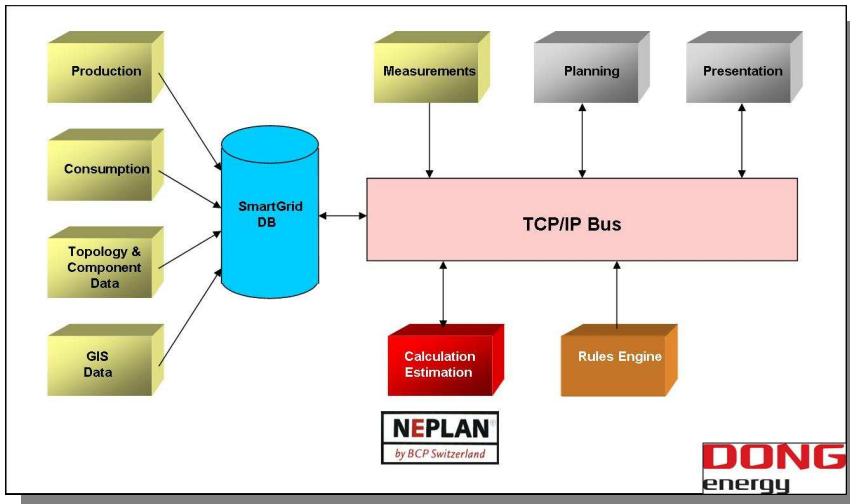


NEPLAN – SmartGrid Application

SmartGrid Implementation Overview



Components for SmartGrid

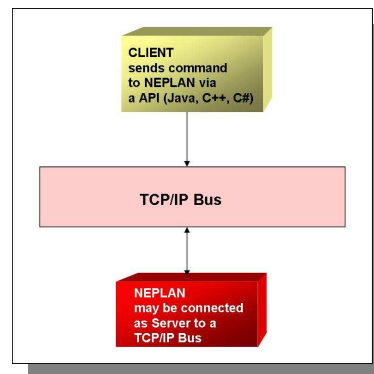
The installed SmartGrid is based on the following main components:

- Database (e.g. Oracle, DB2, SQL Server) to store the whole network state every 10 minutes
- Measurement devices with GPRS communication
- On-line calculation engine (NEPLAN) for load flow, state estimation, etc.
- Rules engine which controls the whole process
- Data presentation and data preparation for later medium and long term planning with NEPLAN

SmartGrid Implementation for MV Network

Every 10 minutes the following tasks are executed in the SmartGrid implementation:

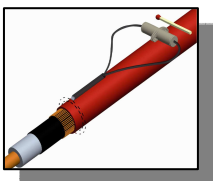
- Get the actual topology from the SCADA system
- Transmit the available **measurement** data (P, Q, I) over GPRS. Typically 10% of the most important points are measured.
- Get the measured consumptions of the most important customers
- Consumption of the other customers are based on **synthetic load profiles**
- Inflow from local productions (e.g. wind mills)
- All data are transmitted through the TCP/IP bus to the database. From there the NEPLAN calculation database will be built up.
- NEPLAN will calculate all values (P, Q, I, U) of the whole distribution network based on **state estimation** and load flow calculations. The results are then retrieved through TCP/IP commands and stored in the database.



NEPLAN can be connected as **Server** to a TCP/IP bus. All NEPLAN data and calculation functions can be controlled by a **client** program. The calculation results will be transmitted over TCP/IP to the database

The **benefits** of such a system among many others are:

- For any point back in time the actual network state may be built up later for NEPLAN and may be analyzed later in detail (off-line analysis).
- This is an extremely **powerful tool for medium and long term planning**
- The whole grid may be continuously observed (on-line analysis)
- This SmartGrid system allows to have a much better overview of the network utilization and reliability
- Present data in web based tools (e.g. Google Maps)



Modern and affordable measurement sensors (e.g. www.sensethepower.com) transmit measured data over GPRS

The SmartGrid system described above is in full operation since 2008 and running very successfully at DONG Energy Distribution (Denmark)

More information and free DEMO at www.neplan.ch