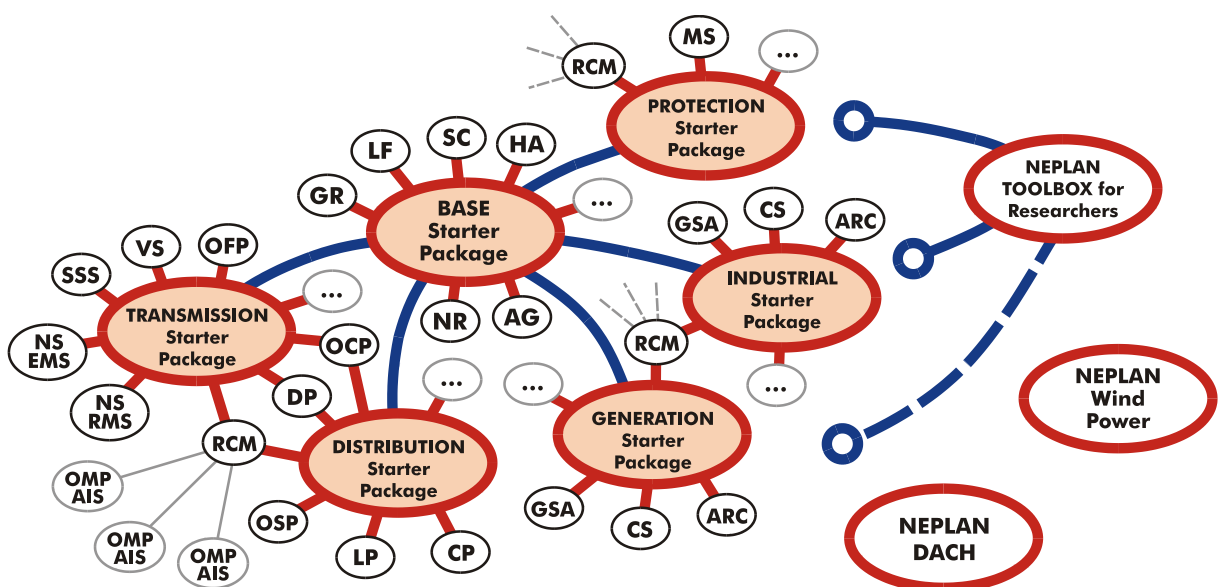# NEPLAN®

Power System Analysis Software

One of the most complete planning, optimization and simulation tools for electrical networks (transmission, distribution, generation and industrial) as well as gas, water and heating networks

Reliable – Efficient – User-friendly

NEPLAN® Software
The state-of-the-art web based analysis tool

NEPLAN is the most advanced and complete Power system analysis tool and is in use all over the world. As this software is used for the planning of transmission and distribution networks, renewable energy systems or distributed systems, smart grids and generation/ industrial plants, the network configuration can be laid over a geographic map, thus improving visualization and the efficiency of planning engineers. A wide range of maps can be used for this purpose such as detailed street maps, aerial and satellite images and basically any type of map data available for geographic information systems (GIS).

Neplan AG offers the world's first full web based power system analysis tool on the market and therefore has all the advantages of cloud computing based on client-server architecture technology.

Technology

- Desktop solution: Installation on a local machine with local project files
- Intranet solution: Installed on a client's server as well as the SQL-database containing the network
- Cloud solution: Installation on a cloud server. The cloud users can decide whether to store the network data in the cloud or to keep the data on a local machine.
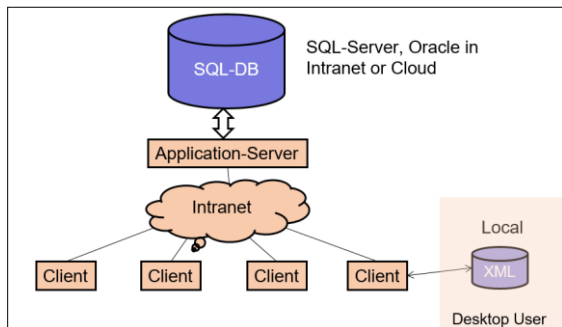
Client-server architecture

Data Management

- Multi-user database with client-server architecture in the cloud or client's intranet server
- User-administration: A comprehensive user administration is available for handling access rights to the master database. Study cases originating from the master database are managed per specific user
- Variant management: Excellent variant management system to handle scenarios, time dependent network versioning and comparison of studies
- Graphical selection and handling of subsets of the complete master database with user rights and their calculation
- Handles electrical as well as gas, water and district heating networks in one common database, which is a requirements for energy hubs optimization.
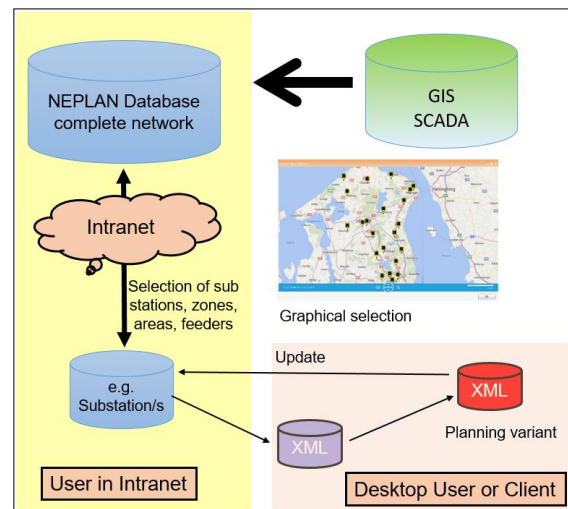
NEPLAN Data Management

Interfaces

- Web services: The calculation engines of NEPLAN can be accessed directly by any external GIS, SCADA or smart grid application through web services for intranet and cloud solutions
- CIM – Interface: Using CIM Manager, it is possible to import and export very complex networks with advanced models as per the ENTSO-E CIM CGMES exchange standard. ENTSO-E awarded NEPLAN® with a Gold Conformity Level in accordance with CGMES for Interoperability Test (IOP)
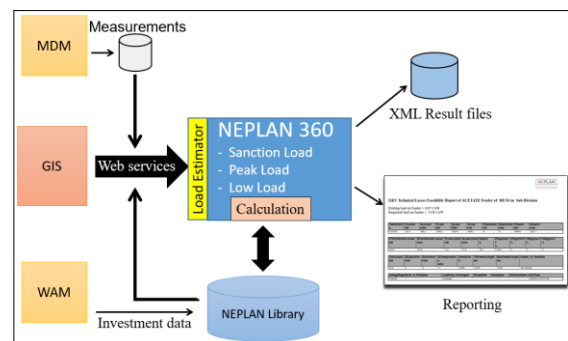
Interfaces to NEPLAN and Web Services

Reporting

- Highly customizable report are generated which are compatible with MS-Office package
- Results and equipment data access by cell-phone

Geographical Maps

- Electrical, gas, water, district heating networks can be overlaid on geographical maps for better visualization
- Integrates a wide range of maps such as street maps, aerial and satellite maps
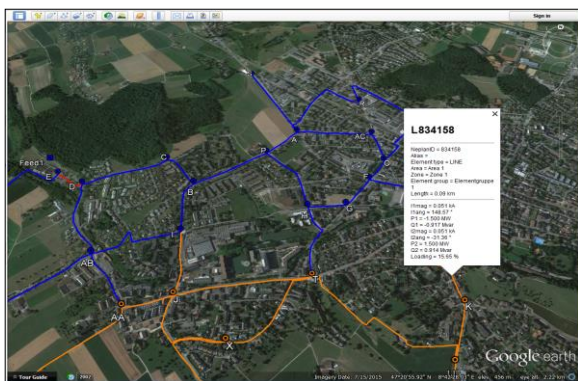- The project can be defined in any national coordinate system

NEPLAN® Network Modelling

Electricity Models

- Handles any combination of meshed 1-, 2-, and 3-phase AC and/or DC network with AC/DC converter
- Represents and solves high-, medium- and low voltage networks simultaneously
- Accurate models for steady state and dynamic network behavior with high performance due to parallel computing (dynamic analysis in real time)
- Network grounding: Grounded, impedance grounded, resonance grounded and isolated
- Renewables: Pre-defined models for Wind turbines (IEC 61400), photovoltaic, dc batteries, fuel cells or other renewable energy sources and storages
- Handles gas, water and district heating systems together with electrical systems (Energy Hubs)
- Real time measurement data and synthetic profiles with load estimation
- Power control through phase shifting transformers, HVDC (2-port or 3-port configuration), FACTS, SVS, etc.
- Huge library with pre-defined controller for AVR, turbines, governors, PSS, HVDC, secondary controls, etc.
- Macro-language as in MATLAB® for defining control circuits or protection devices
- Calculation modules could be used as integrated part of an on-line SCADA system

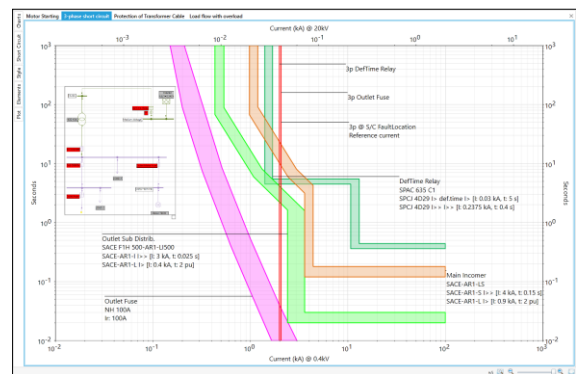## Gas, Water & Heating Models

- Sophisticated valve and regulator models for gas pipe flow analysis
- Simultaneous calculation of different pressure zones
- Temperature dependent loads for gas pipe flow calculation
- Simulation of reservoir filling and emptying processes
- Gas/Water/Heating interactive distribution and 2D-profile
- Fire-fighting water plan
- Calculation of heat exchanger, heat plant, centrifugal and circulation pumps, etc.
- Pipe optimization and network calibration

Graphical User Interface

- Most user-friendly graphical database editor with powerful CAD editing facilities
- Multi-document and multi-window system
- Multi-diagram and multi-layer technique which is useful for substation layout in the geographical network and single line diagram
- Result comparisons of different variants
- Excellent chart manager for result evaluation
- User-defined coloring of the network according to feeders, voltage levels, partial networks, network violations, component type characteristics, etc.
- Visualization of the network in Google Earth
- App for equipment data access for cell-phones

Load Flow calculation results with geographical map
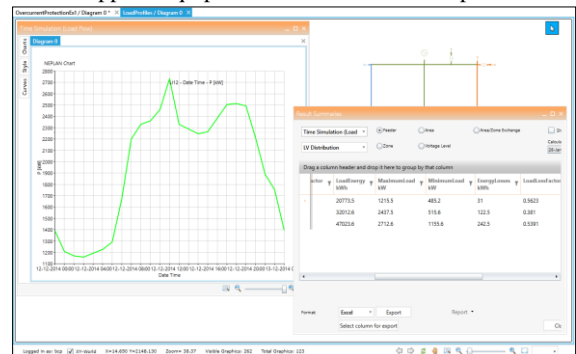
Energy loss calculation (Time Simulation)

Visualization of an electrical network with results in Google Earth based on NEPLAN project

Overcurrent Protection (Selectivity Analysis)

NEPLAN® Calculation Modules

Base Modules
- Load flow analysis
- Load estimator based on measurements
- Energy loss calculation
- Motor starting analysis
- Line parameter calculation
- Network reduction
- Cable sizing for industrial plants
- Low voltage calculation
- Hosting Capacity for PV and eMobility

Safety Modules
- Short circuit analysis
- Arc flash calculation
- Substation grounding (IEEE/IEC)

Security Analysis
- Contingency analysis
- State Estimator
- Net transfer capability (NTC)
- Voltage stability

Protection Studies
- Overcurrent protection/Selectivity analysis
- Distance protection
- Fault finding
- Protection Data Management System (PDMS)

Dynamic Analysis
- Dynamic Stability (RMS)
- Electro-magnetic Transient (EMT)
- Small signal stability

Optimization / Cost Savings
- Energy hub optimization (gas/district heating)
- Optimal network restoration strategy
- Economic cable sizing and thermal analysis
- Optimal capacitor placement
- Optimal separation point / switching
- Investment analysis (Present Value)
- Phase swapping / balance
- Multi-period and N-1 constrained OPF
- Evaluation of Reliability Index (ERIS)

Power Quality Studies
- Reliability analysis
- Harmonic analysis
- Flicker analysis
- Voltage unbalance

Gas/Water/Heating
- Gas pipe flow analysis
- Water pipe flow analysis
- District heating analysis
- Pipe optimization
- Network calibration
- Time / dynamic simulation
- Fire water plan

Asset Management
- Reliability centered maintenance (RCM)
- Asset simulation / LCC-Calculation

NEPLAN includes all the complex calculation and simulation modules needed for network studies. The modules can be bought under a specific package depending on the network type or as a single module.

The summary of power engineering

NEPLAN is one of the leading power system analysis software packages in the world. Small and large utilities, industrial organizations, engineering companies and universities in more than 120 countries around the world have appreciated our Swiss high quality products for more than 30 years.

The software has an extremely user friendly and powerful graphical user interface. Project studies are done up to 40% faster with NEPLAN than with any other analysis tool, resulting in considerably lower costs.

NEPLAN is best suited for smart grid and wind power applications because all necessary models, simulations and control methods are integrated with very high accuracy and performance. The sophisticated automatic initialization tool significantly reduces the time in the initialization of controllers for dynamic analysis.

Risk based analysis (e.g. network reliability analysis, re-investment strategies, etc.) has become one of the most important tasks for a planning engineer. NEPLAN offers unrivaled models and algorithms and has therefore become the de facto standard for risk based planning. It is the only tool which includes an integrated RCM and "Asset Simulation" module as well as Gas, Water and Heating modules.

More information and free DEMO visit at **www.neplan.ch**