# CLOUD COMPUTING WITH NEPLAN V10/360

INTRODUCTION

Sustainable Development is one the main objectives around the world. Researching groups present energy management systems, sustainable mobility and renewable energy sources as base for new market models. Quality and continuity for power suppling is improved in consideration with the environment impact and warrantees for energy resources conservation.

New generation system technologies have allowed that conventional electrical infrastructure changes its operation form. For example, distributed generation based on renewables offers some benefits in new market models, resilience and environment conservation. However, if the implementation of these systems is not controlled, the networks will have operative problems. Renewable resources operation (operational uncertainty), storage schemes and load mobility (electrical vehicles) cause overvoltage and bidirectional flows on the networks, for that reason network automation is too important to solve them.
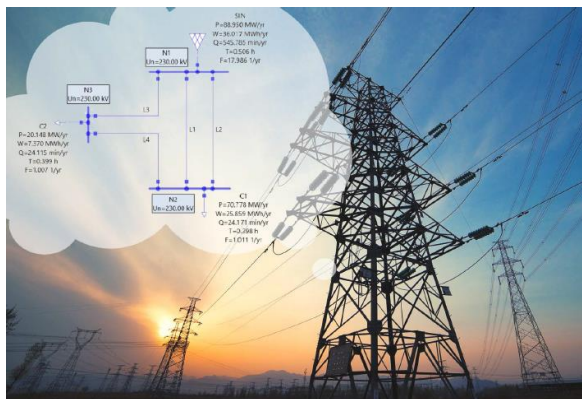
¿How could we automate the networks?

Engineering solutions around the world present *Cloud Computing* as fundamental component for automation schemes implementations, because direct connections would be possible between digital technologies (like measurement intelligent devices) with the network digitalization. In addition, *Cloud Computing* capabilities allow services for information management systems and asset management.

This document shows some *Cloud Computing* advantages for an intelligent planning and power systems operation. It presents *Cloud Computing* as an important component for monitoring, automation and control of networks.

CLOUD COMPUTING CONCEPT

Most productivity, low cost and minimum effort. Cloud services offer most agility and efficient operation (i.e. a letter physically takes most time that sending an email). Now, if you are going to apply this concept for power system simulations; support services, licenses, maintenance and updates will be only provider responsibilities and not from the users.

Cloud Computing concept is not only storage capability (is one of the services with this system) but also uses informatics resources and services. It considers an access to the information from any place, any time. Many applications (Infrastructure as a Service IaaS, Platform as a Service PaaS and Software as a Service) allow multiple strategic implementations for information management systems, processing (calculation) and storage on cloud. For the electrical infrastructure offers many applications for network automation, asset management, Big Data, planning, analysis and power systems operation. *Cloud Computing* concept reduce investment for Hardware and Software acquisition because licenses can be services.

Scalability and flexibility advantages for user applications with *Cloud Computing* allow integration with external systems, interoperability and own developments based on web services. Opportunities for team works, backup and cybersecurity are part of the concept advantages.

High processing and storage systems have got importance with incorporation of digital technologies and communication protocols for a reliable operation of the electrical infrastructure. *Cloud Computing* has made possible to connect several processors (cluster) and it increases the calculation capabilities.

Some advantages with *Cloud Computing*:

- Cost reduction
- Automated updating for simulation platforms
- Informatics resources optimization
- High capability processing
- Updated technology
- Safety technology
- Resilience
- Accessibility to the information
- Digital systems integration

NEPLAN V10/360 is the first solution for power system analysis based on Cloud Computing, it allows efficient control, confidentiality and security for user's information.

THE MODERN NETWORK WITH CLOUD COMPUTING

Cloud Computing is one of the most powerful techniques for Smart Grids applications and new solutions for networks operation. It allows an access to computational resources (storage, servers and applications) immediately with a minimum effort and without supplier interaction with. It is not necessary to use desktop applications.

Cloud Computing avoid technical support issues, updates and local informatics risks. Moreover, the networks digitalization has taken importance due to automation schemes and communication protocols in order to define specific objective functions (losses reductions, environment impact, costs reductions...). It means, *Cloud Computing* allow the users participation, quality control, asset management and standardization compliance in consideration with networks digitalization and their simulation directly on client-server architectures. Digital technologies have made possible adopt new market models and new optimization strategies for networks operation with *Cloud Computing*.

For different companies and utilities, *Cloud Computing* allows to implement solutions in order to avoid risks implied by networks digitalization and automation schemes.
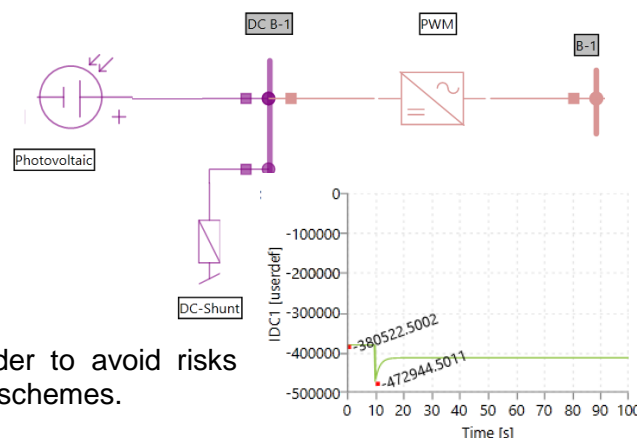
Some applications with *Cloud Computing* for modern networks:

- Demand Respond
- Dynamic Pricing
- Energy management systems
- Intelligent Measurement
- Earlier warning systems
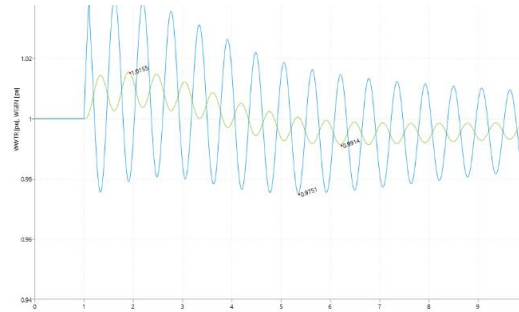
Application schemes with *Cloud Computing* allow the following characteristics: agility, reliability, security, performance, multi-agent systems, cost reduction, asset management and high observability.

¿WHY CLOUD COMPUTING WITH NEPLAN V10/360?

Because the **NEPLAN V10/360** operation form and multiple applications. This is the first solution on the market for power system simulations based entirely on real client-server architecture. It can run on Web or Locally. This application allows to use calculations through Web Services and makes easy integrations with any external system. It is not a software installation and even the users can apply modules independently for many applications on the electrical infrastructure.
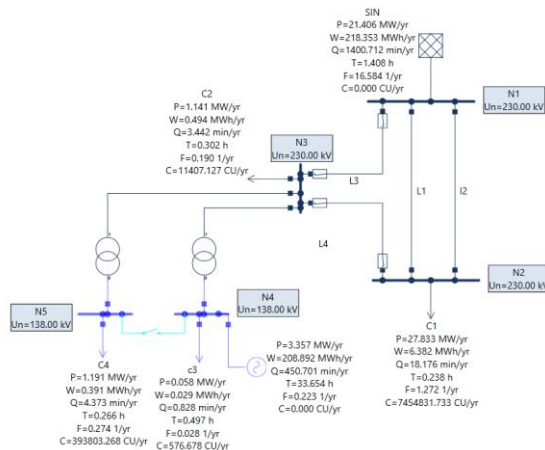
NEPLAN V10/360 has multi-user database based on MS-SQL or Oracle and allows to handle large networks (the user can simulate the whole networks or part of them). The simulations come from a master system and can be handled by specific users. Any calculation module can be executed on server or locally. Moreover, files can be stored on cloud or computers.

NEPLAN V10/360 isn't a remote software installation! It means the user has direct connection based on real client-server architecture. On the other hand, it makes easy database importations from some simulation software packages (like PSS/E, PowerFactory, CYME,…). Likewise, compliance about requirements with Common Information Model (CIM) is according to ENTSO-E specifications.

NEPLAN V10/360 includes all components for real-time integrations and allows scenarios identification, time simulations and states estimation. It makes easy predictive analysis and networks operation in real time. Moreover, it has the most powerful Dynamic Simulator on the market for analysis in RMS and EMT domains. This cloud simulation platform includes many tools for user control, access permissions and network edition, as well as the services operation for event registration and data encryption. The **NEPLAN V10/360** *Cloud Computing* cluster bases the application on distributed servers around the world.

¿How NEPLAN V10/360 reduce costs for the users?

Three different components that users should consider:

About License Schemes

- The Hardware acquisition for cloud solution is not necessary because any user can access to the Software on browser
- The user can access to the Software as a service for an specific period on cloud solution
- Technical support for cloud solution is not required to update the Software
- The software maintenance is automatically without user participation
- The intranet solution uses only the server resources
- Any module can be provided as DLL

About Software Operation

- The users can work on different parts of the networks and/or different applications on the same network
- Files don't require the users storage capabilities
- Energy systems (Gas, Water and Electricity) can be handled on the same Software
- The users can access to any project any time in cloud solution (even out of the office through Internet connection)
- Allows real client-server architecture and increase cybersecurity

About Network Operation

- The user can implement automation schemes for costs reductions and losses reductions
- On-line simulations allow On-line decisions through *Cloud Computing*
- The user can use Web Services for networks operation
- The user can use any calculation module directly on any SCADA system
- *Cloud Computing* makes easy the integration with digital technologies (AMI, PMU, IED…)

… Let us to present in your company more advantages that **NEPLAN V10/360** offers with *Cloud Computing*!