



## ALSTOM Grid Technical visit in Villeurbanne – Friday 19 June 2015

### Smart Grid and Digital substation developments

**Digital substation architecture:** a general overview of **digital instrument transformers and merging units** will be shown, covering optical, rogowski and capacitive technologies. The digital integration platform will be presented, with details about test methodology and process bus and station bus configurations. A demonstration of the **protection scheme reaction** when connected with digital and analogue measurement chains will be made, using circuit-breaker tripping commands by optical fibre GOOSE. A showcase of the **DS Agile digital control system** will be exposed, in a configuration which operates disconnectors. All demonstrations will be compliant with the engineering principles of the IEC 61850 standard. Discover also in duplex our Digital Substation Solutions from Alstom's showroom in Montpellier.



Join a **Q&A session with ERDF on the first experiences from the NiceGrid new automation architectures.** The demonstrator's objective is to develop a smart electricity grid by integrating a high percentage of solar panels, energy storage batteries and intelligent power meters installed in the homes of volunteer participants. Alstom Grid's energy management system centralizes data and optimizes power generation, demand management, and storage across an entire district. This system monitors grid operating conditions (i.e. forecast solar power generation, forecast consumption, and technical constraints) as well as the extent of flexibility, in terms of generation, demand management and storage, offered by the various industry participants (electricity supplier, distribution network operator, aggregator). The energy management system then uses this information to operate the grid as efficiently and economically as possible.



**Get introduced to the Soft Open Point AC-DC-AC conversion for distribution grids.** SOP (Soft Open Point) is a power-electronics device allowing to maximizing existing asset utilization, while maximizing network stability margins, and minimizing fault over-currents due to its natural firewall. SOPs can be connected in parallel between two or more feeders (in case of multi-terminal SOP) or in series between two different networks. Given their back-to-back power electronics nature, SOP devices allow for full 4-quadrant control at every AC network interconnection point they have. They also allow to fine-tune power flows across such networks (planned and real-time). The networks may also have different frequencies or even operate in DC (zero frequency). In essence, SOP devices allow networks connections that would not otherwise be directly interconnected. Found out how it was integrated into the Green eMotion demonstrator project. The project has defined and demonstrated a European framework that connects all electromobility stakeholders for a seamless, cost-efficient, and interoperable electromobility ecosystem.





**SuperGrid Institute:** A brief presentation of the SuperGrid Institute will be offered, followed by two technical presentations related to **MVDC technologies**. One presentation will be related to off-shore wind farms MVDC collector architectures. Another one will be related to **DC-DC conversion** with Dual Active Bridge and Medium Frequency Transformer. This technology will be applied in e-transformer for rail application and in MVDC grid collector.



**Created in 1912, the Villeurbanne site of Alstom Grid** develops, designs, manufactures and maintains High Voltage circuit breakers. **The Research Centre**, located on this site, is the worldwide excellence center for switchgears. It develops new technologies in the fields of high voltage Gas Insulated or Air Insulated Switchgears, **AC&DC breaking technologies** and digital substation. Its laboratory CERDA is certified and tests or qualifies Alstom as well as third party products. On the same site, **the Product Unit** is the competence center for **Generator Circuit Breakers**. These Circuit-Breakers are connected to isolate the power plant from the network and have a very high breaking capacity. This unit is the competence center for high voltage **Live tank Circuit breakers** from 245kV up to 1200kV as well. These Circuit-Breakers are suitable to make, withstand and switch off current under rated voltage condition.



Villeurbanne site is also **the SuperGrid Institute** location which has been created in January 2014. This Institute gathers researchers from industry and academic research, in order to develop new technologies addressing challenges of future electrical transmission grids, and particularly HVDC grids. Throughout its five research programs, SuperGrid Institute covers the following technical domains: power system architecture and control, technologies for switching and breaking, technologies for power conversion, cable technologies, storage technologies for the grid.

