

# Power Grids for the planet

## Transporting and operating sustainable energy safely and reliably

A paper by the Very Large Power Grid Operators

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The Very Large Power Grid Operator Association (VLPGO) encompasses the world's largest Power Grid Operators (PGOs) representing together more than 60% of the electricity demand in the world.

This paper's aims are to explain the role the PGOs play in developing power grids and to introduce the goals and the objectives of the VLPGO.

### **Electricity and the Consumer**

Electricity is considered the most significant contribution to human progress in the last century because it allows any source of primary energy (renewable, fossil, nuclear, etc.) to be converted into a form that can be transmitted in an efficient way to end users. The role of electricity will continue to be one of crucial importance, but how it is generated and delivered will change rapidly over the next few decades. As energy efficiency and smart grid technologies are adopted, consumers will have more choice on how they use electricity and power transmission will be more secure.

### **Supplying the World's Electricity**

Power grids, and the continuous development of their supporting infrastructure, play an essential role in promoting the social welfare of populations around the world. Power grid operators recognize that a reliable and safe supply of energy is their responsibility. It is the main objective of grid operators to ensure the needs of consumers are met. Maintaining high standards for power supply quality and reliability at minimum costs remains, therefore, the main mission of the PGOs.

The PGOs work constantly to plan, monitor, supervise and control the energy they deliver as a continuous process 24 hours a day. The PGOs also recognise their performance is very visible and see it as a privilege to play such a vital role for the society.

This privilege implies for the PGOs a duty to actively develop the power grids. The PGOs also seek the opportunity to inform key decision makers and stakeholders of proposals for future developments and the interaction with other economic and regulatory policies.

PGOs play several key roles in the transmission and system operation for the electricity supply chains that power modern societies:

- *acting on behalf of Consumers*, to ensure quality while minimising costs and recognising economic and societal dependence on electricity;
- a *technical role* in planning, designing, and managing the Power Systems;
- an *interface role* with generators, market participants and distributors, which are the most direct users of the transmission grid;
- a natural role of *interlocutors* with power exchanges, Regulators and Governments.

## **Facing the Challenges of Smarter Energy**

Some complex challenges are being introduced to the power grid: (1) the deregulation of markets and the introduction of competition, and (2) technical challenges of providing secure and reliable electricity as technology and energy production processes have changed. In recent years, PGOs have been developing their operations to accommodate technical advances like smart grids, changing power generating technology, and the pressing environmental challenges of reducing greenhouse gas emissions. And of course, PGOs continue to respond to market changes and the increasing connections between national boundaries for the transmission of power.

PGOs have developed techniques to ensure production and consumption are matched continuously. Increasingly the PGOs have been integrating more dispersed and intermittent forms of generation such as from renewable energy sources and will shortly be integrating electric vehicle and primary energy storage into a unique and harmonised system. This integration will require advanced management of demand through smart metering technologies amongst others and increasingly sophisticated automatic control systems not seen before in electricity grids.

Another way the PGOs have ensured consumers of their supply of electricity is by interconnecting regional and national electricity grids. In this scenario, economies of scale can be brought to share reserves of energy, increase reliability and to allow trading across national boundaries benefiting consumers.

## **Leading the Transition to Grid of the 21<sup>st</sup> Century**

The VLPGO is an international voluntary association established in 2004, following several blackouts across the world in 2003, to investigate fundamental issues of common interest and to develop joint action plans for power system security.

In 2009, the VLPGO moved to a more structured Organization, with the scope of being a leader and catalyst in the transition of the electric power industry to the power grids of the 21<sup>st</sup> century.

Through the activities of the VLPGO Members seek to achieve:

- an international consensus on strategic issues challenging the very large power grid and market operators;
- a common vision with respect to the technologies and best practices required to address those issues in a framework of social and environmental responsibility of each member;
- the dissemination and implementation of a common vision through information exchange, collaborative projects and cooperation with other international organizations.

The VLPGO has agreed some key strategic themes to ensure quality and reliability are maintained:

- keep up with the fast growth of electricity demand in many areas of the world;
- develop power grids to allow the trading of energy to facilitate competition and to reduce costs to consumers;
- develop power grids to accommodate the increasing penetration of renewable energy;
- develop increased inter-connections between power grids to enable the transfer of energy between national power grids and to develop interoperability standards to maintain the efficiency and the reliability of interconnected power grids;
- work with Regulators, Governments and other Agencies to remove barriers.

The VLPGO 6<sup>th</sup> Steering Board Meeting, held in Washington D.C., put in place an agreed set of actions to be developed which are worldwide strategic themes for the power grids:

- enhanced security and system restoration practices;
- advanced power grid monitoring and control systems;
- integration of renewable energy sources into power grids;
- deal with the increasing use of HVDC links in synchronous power systems;
- electricity storage including the adoption of Plug-in Hybrid Electric Vehicles (PHEVs).

Through its formation and focused activity of work, the VLPGO aims to play its central role in the continuing reliable, safe and efficient operation of the power grids and as economic and regulatory drivers continue to advance, the VLPGO must maximise the understanding and the experience exchanging among its Members in order to develop projects of common interest to ensure the best outcomes are achieved.

### **Some References**

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### **Differentiation of sources**

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### **Growth of Energy Demand**

[6] World Energy Council – Energy Policy Scenario to 2050. Four scenarios available. On the average: about +100% in the next 40 years.

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[9] EC/DGTREN - March 2008: PROGRESS - Promotion and growth of renewable energy sources and systems

[10] EC/DGTREN - February 2007: OPTRES - Assessment and optimization of renewable energy support schemes in the European electricity market