



# PLANIFICACIÓN ENERGÉTICA (PELP) Y DE EXPANSIÓN DE LA TRANSMISIÓN (PET)

Modulo 3: Desarrollo de Interconexiones y Tecnologías

**SEMINARIO CIGRE**

Abril 2018



# INTERCONNECTIONS

## ➤ ADVANTAGES

- System Security & Resiliency
- Stability & Robustness
- Energy Markets Exchange
- Energy Matrix Diversity
- Sharing Reserves

## ➤ OPPORTUNITIES

- Local (Sub-systems)
- Regional (Argentina, Peru)





# TECHNOLOGIES

## ➤ ENERGY INDUSTRY

- Smart Grids
- PMUS, WAM, WAMPAC
- HVDC & FACTS
- Storage & EV
- Microgrids
- Smart Inverters
- RTDS
- Artificial Intelligence

## ➤ ICT

- Telecom
- Big Data
- Blockchain....etc.

## HVDC & ENERGY STORAGE





# HIGH VOLTAGE DIRECT CURRENT - HVDC

## ➤ STATE OF THE ART

- Line Commutated Converter – LCC
- Voltage Source Converter – VSC

## ➤ ADVANTAGES

- Bulk Power Transmission
- Reduced Right of Way – ROW
- Integration of Renewables (On- Off-shore)
- Grid Stability & Control
- Asynchronous connections
- MTDC

## ➤ OPPORTUNITIES

- North-Center MTDC (CNE Expansion Plan)
- South-Center (500kV System Upgrade)
- Chile-Argentina
- Chile-Peru





# ENERGY STORAGE

## ➤ STATE OF THE ART

- Electro-chemicals: Conventional batteries, Flow batteries
- Electro-Mechanical: CAES, Pump storage, Flywheels
- Others: Supercapacitors, Hydrogen, Thermal, Fuel cells

## ➤ APPLICATIONS

- Generation: renewable smoothing, arbitrage
- Transmission: investment deferral, congestions relief
- Distribution: demand side management, reliability
- Ancillary Services: regulation, ramping, voltage support

## ➤ OPPORTUNITIES

- Transmission investment deferral
- Reduce renewable curtailment
- Frequency regulation, voltage & ramping support







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