RELIABLE AND SUSTAINABLE POWER GRIDS

WG 7 Common Modeling

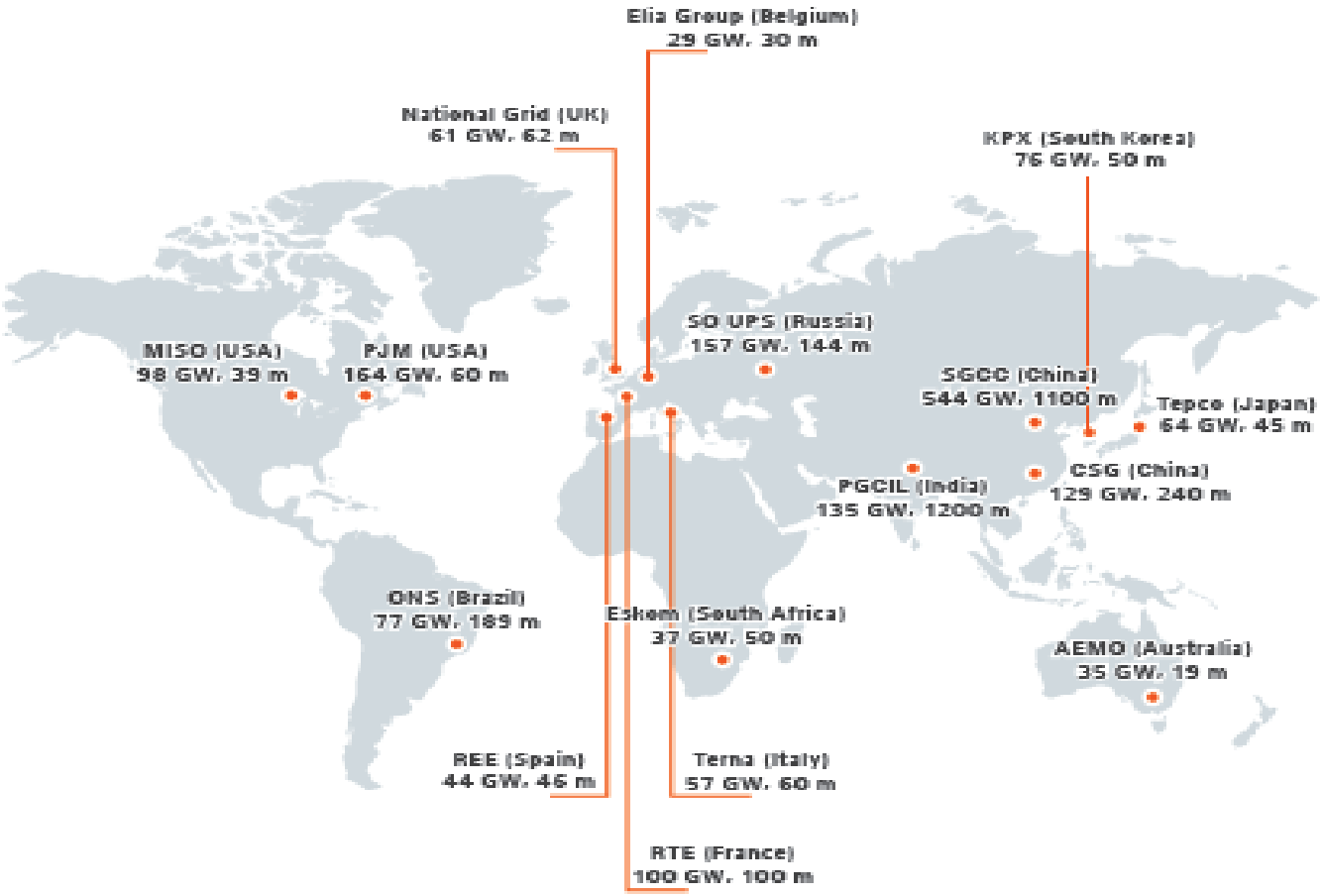
2012 Final Report on Energy Storage

IEA Energy Storage Technology Roadmap
Stakeholder Engagement Workshop
12-13 February 2013

Introduction to GO 15

- **"GO 15. Reliable and Sustainable Power Grids" (GO 15)** - former name VLPGO (Very Large Power Grid Operators) changed in 2012
- a voluntary initiative of the world's **16 largest Power Grid Operators**
- created in **2004** in response to several blackouts across the world with a goal of investigating fundamental issues of common interest to its members and developing joint action plans addressing improvements to power system reliability
- became a formal organization in **2009**
- **GO 15 members:**
  - represent together more than **70%** of the world's electricity demand
  - provide electricity to **3.4 billion** consumers on the 6 continents
  - responsible for integration of **2518 GW** of generation capacity into the grid, of which **21%** is from renewable energy sources.

GO 15 Members Map



** The information for each member refers to peak load and customers served.*

Introduction to GO 15

In 2013: **10 Working Groups** led by GO 15 members

Topics discussed include:

- Power system reliability and security
- Advanced power grid monitoring and control systems
- Development and application of new "smart grid" technologies related to high and ultrahigh voltage direct current transmission lines
- Integration of renewable energy sources
- Development of electric vehicles
- Demand Response
- New storage solutions
- Supervision and visualization of electric power grids
- Other related topics.

Visit our website at www.go15.org
Please see our leaflet distributed at this event for more information

Executive Summary

- Energy Storage is primarily dependent upon the amount of wind, and demand response penetration among others (i.e. energy prices)
  - Hence working group (WG) #7 suggests consolidation of similar groups such as Integration of Renewables (WG #3), FLEXILWATTS (WG #4), and Electric Vehicles (WG #6)
  - Key drivers for consolidation include:
    - Amount of wind coming online in the next few years (e.g. 90 GW in China by 2015, 45 GW in India by 2022)
    - GO 15 value proposition around economies of scale
- Each of the WG members approach their planning and market analysis with rigor, that is grounded in stochastic risk based modeling framework
  - Hence WG #7 suggests a common modeling platform to leverage the experience and further evaluate the effect of individual variables (i.e. wind, demand response) on large scale storage penetration
  - Key drivers for common modeling include:
    - Upcoming regulatory policies towards non-carbon emitting resources
    - GO 15 overall goal towards helping members prepare for the 2020 operating scenario

GO 15 Members Storage Portfolio Evolution

Pumped Storage Technology

PJM, USA	5,500 MW
RTE, France	5,000 MW
KPX, Korea	4,700 MW
TERNA, Italy	4,017 MW

Battery Storage

PJM, USA	32 MW, 8 MWh Lithium-ion
KPX, Korea	4 MW, 8 MWh Lithium-ion
REE, Spain	1 MW Lithium-ion

SYSTEM Characteristics (Energy %)

	Coal	Gas/Oil	Nuclear
ESKOM, South Africa	81%		
AEMO, Australia	79%		
MISO, USA	75%		
SGCC, China	74%		
POWERGRID, India	65%		
TERNA, Italy		59%	
TEPCO, Japan		57%	
NGRID, UK		49%	
RTE, France			52%
ELIA, Belgium			50%

CURRENT

Non carbon emitting portfolio

	Wind	Solar	Nuclear
SGCC, China	90 GW by 2015	5 GW	39 GW
POWERGRID, India	45 GW by 2022	20 GW by 2022	20 GW
REE, Spain	35 GW by 2020	11.5 GW by 2020	
MISO, USA	23 GW by 2015		
Terna, Italy	13 GW by 2020	23 GW by 2016	
RTE, France		8 GW in 2020	

FUTURE

Proposed New Activities

- **Consolidation of various working group modeling opportunities**
  - Integration of Renewables, WG #3
  - FLEXILWATTS, WG #4
  - Electric Vehicles, WG #6
  - Energy Storage, WG #7
- **Modeling workshop**
- **Common Model development**
- **Phase 2 Analysis**
- **Phase 2 Report**

2013-14 Proposed Work Plan

Task	Draft Schedule
Consolidation of modeling opportunities from various Working Groups	January – June 2013
Modeling Workshop	July 2013
Common Model Development	August – December 2013
Phase 2 Analysis Kick off	January 2014
Phase 2 Analysis	January – June 2014
Phase 2 Report Development	July – November 2014
Phase 2 Report	December 2014

G15 RELIABLE AND SUSTAINABLE POWER GRIDS

Questions ?

AEMO AUSTRALIAN ENERGY MARKET OPERATOR

elia group 50hertz elia Powering a world in progress

nationalgrid

smart KPX Power Exchange

पावरग्रिड POWER GRID CORPORATION OF INDIA LIMITED (A Government of India Enterprise)

pjm

国家电网公司 STATE GRID CORPORATION OF CHINA

Rte Réseau de transport d'électricité

MISO

Terna

SO UPS

Renewable Policy Statements Summary

Renewable Policy Statements Summary

Working Group # 7	Renewable Power Mandate
AEMO – Australia	The Renewable Energy Target for Australia is 20% by 2020.
ELIA – Belgium	Bureau Federal du Plan - the nuclear power plants will be progressively phased out starting in 2015 until 2025.
SGCC – China	China has promised to increase non-fuel energy to 15% of first energy resources in 2020, and reduce greenhouse gas emission in Gross Domestic Product (GDP), which in 2020 is 60-66% of the total emissions in 2005.
RTE – France	Mandates to add significant amounts of renewable resources (23% in 2020), plus environmental regulations for coal that affect coal-fired generation.
POWERGRID – India	Low carbon growth strategy is being emphasized in the policy making (i.e. Electricity Act, 2003, National Electricity Policy, and related polices of Govt. of India along with Renewable Purchase Obligation (RPO) of various utilities mandated by appropriate regulatory commissions)
Terna – Italy	National Renewable Action Plan updated with the last government decree (5th "Conto Energia")
TEPCO – Japan	On August 26, 2011 the law that electric utility must buy renewable energy with a fixed price was passed in the Japanese Parliament.
KPX-KOREA	Korea Government mandated Renewable Portfolio Standards (RPS) from 2012.
Eskom – South Africa	National government objective - carbon emission reductions from 2025.
REE – Spain	European and Spanish energy policies considered 20-20-20 targets.
National Grid – UK	Office of Gas & Electric Markets (OFGEM) regulations coupled with Government targets for e.g. carbon reductions criteria for 2050
MISO – USA	State mandated Renewable Portfolio Standards (RPS)