

8:15–9:00	Registration of Participants—Western Room on the 11th Floor, Minzu hotel
<b>Morning Sessions</b>	
9:00–10:00	Opening Remarks and Keynote Address by Representatives from the Government of the People's Republic of China, the State Grid Corporation of China, and the Asian Development Bank
	National Energy Administration, NDRC <b>Mr. Shi Lishan</b> , Deputy Director General, Department of New and Renewable Energy NDRC (to be confirmed) National Center for Climate Change, NDRC <b>Mr. Li Junfeng</b> , Director General Asian Development Bank <b>Mr. Ayumi Konishi</b> , Director General, East Asia Department State Grid Corporation of China <b>Mr. Shen Jiang</b> , Director General, Science and Technology Department
10:00–10:30	Introduction to the Grid Integration of Wind Power Workshop ( <b>Mr. Pradeep Perera</b> , Principal Energy Specialist, Asian Development Bank)
	<ul style="list-style-type: none"> <li>Goals of the workshop</li> <li>Wind power myths debunked (Nature of wind energy, issues related to integration, bring everyone to think about what are the real issues)</li> </ul>
10:30-10:45	C O F F E E / T E A B R E A K
Session 1 10:45–12:15	Strategic and Policy Issues Affecting Scale up of Wind Power Development (Session Chair, <b>Mr. Ashok Bhargava</b> , Director, Energy Division, Asian Development Bank and the participants include <b>Mr. Wang Weisheng</b> , National Wind Research and Testing Center; <b>Mr. Sanjay Garg</b> , General Manager, Ministry of Power in India; <b>Mr. Geoff James</b> , Senior Scientist, CISIRO Australia; and <b>Mr. Pramod Jain</b> , Senior Consultant, USA):
	Panel Discussion with the participation of several key experts from Asian countries including the PRC on Strategic and Policy Issues Confronting Wind Power Integration <ul style="list-style-type: none"> <li>Each participant will provide a brief introduction on the status of wind power integration in their country and the key issues they are facing at present (10 minutes each)</li> <li>The panelist discusses how these issues are expected to be resolved and the strategic approach of the government and the industry to overcome them</li> </ul>
12:15-1:00	L U N C H — M a i n R e s t a u r a n t G r o u n d F l o o r
<b>Afternoon Sessions</b>	
Session 2 1:00–3:00	Issues and Challenges in Having Significant Share (over 10%) of Electricity Generation from Wind Power (Session Chair, <b>Mr. Aiming Zhou</b> , Senior Energy Specialist, Asian Development Bank)
	Long-term System-Wide Analysis of Maximum Amount of Wind Energy in a Grid ( <b>Mr. Nick Miller</b> , GE Energy Management) <ul style="list-style-type: none"> <li>Analyzing the ability of an electrical network to absorb variable sources of energy (wind energy)</li> <li>Tools and methodologies used to determine the amount of RE penetration in the grid?</li> <li>What does it take to increase the amount of variable source on the grid?</li> <li>Economics of increasing variable generation</li> <li>Managing variable generation with hydro, gas plants</li> </ul> <p>Chinese Experiences and Challenges of Integrating Large-Scale Wind Power to Power System (<b>Dr. Bai Jianhua</b>, Deputy Chief Economist, State Grid Energy Research Institute)</p> <ul style="list-style-type: none"> <li>Current state of wind power development in the PRC (Capacity Distribution)</li> <li>Key issues on wind power absorption</li> <li>Long-term planning of wind power development</li> <li>Solutions for wind power absorption (relationship between wind power curtailment and installed capacity, wind power transmission planning based on UHV, etc.)</li> </ul>
03:00–03:30	C O F F E E / T E A B R E A K
Session 3 3:30–5:00	Grid Code for Integrating Wind Power to Grid (Session Chair, <b>Mr. Zhang Lei</b> , Energy Specialist, Asian Development Bank)
	Grid Code Requirements and Best Practices ( <b>Mr. Nick Miller</b> , GE Energy Management) <ul style="list-style-type: none"> <li>Different components of grid code: LVRT, voltage &amp; frequency characteristics, harmonics, exchange of data between SCADA and dispatch center, others</li> <li>Review of the Danish grid code and how it provides balancing generation capacity for wind integration</li> <li>Customizing grid code to a country's grid capabilities and realities</li> <li>The different types of wind generators and their electrical characteristics</li> <li>Measuring compliance with grid code</li> </ul> <p>Chinese Experiences in the Development of Grid Code and Guidelines for Wind Power Interconnection (<b>Dr. Chi Yongning</b>, China Electric Power Research Institute)</p> <ul style="list-style-type: none"> <li>Chinese technical standards for wind power grid integration <ul style="list-style-type: none"> <li>Active power control and reactive power control</li> <li>Low voltage fault ride through capability</li> <li>Voltage and frequency requirements</li> <li>Harmonics</li> </ul> </li> <li>Shortcomings of PRC's existing grid code and proposed improvements</li> </ul>
5:00-7:00	D I N N E R — M a i n R e s t a u r a n t G r o u n d F l o o r

8:15–9:00	Registration of Participants—Western Room on the 11th Floor, Minzu hotel
<b>Morning Sessions</b>	
Session 4 9:00–10:30	<b>Interconnection Studies for Integrating Wind Power Plants</b> (Session Chair, <b>Mr. Pradeep Perera</b> , Principal Energy Specialist, Asian Development Bank)
	Technical Studies for Impact of Wind Plant on the Grid ( <b>Mr. Nick Miller</b> , GE Energy Management) <ul style="list-style-type: none"> <li>Methodologies for determining impacts on the reliability, safety, (transient, voltage, and frequency) stability, and thermal loading capacity of the power system</li> <li>Best practices for modeling power flow, analyzing stability, and short circuit</li> <li>Approaches to determine the grid improvements and upgrades triggered by the proposed wind farms, and develop cost estimates</li> </ul> <p>Chinese Experiences on Wind Interconnection Studies. Different Types of Interconnection Studies, Based on Size of Wind Farm (<b>Dr. Zhu Lingzhi</b>, Chief Engineer, State Grid Electric Power Research Institute)</p> <ul style="list-style-type: none"> <li>Data requirements for performing interconnection study</li> <li>Processes and tools employed for studies</li> <li>Shortcomings of PRC's interconnection studies and proposed improvements</li> </ul>
10:30–10:45	<b>C O F F E E / T E A B R E A K</b>
Session 5 10:45–12:45 p.m.	<b>Emerging Technologies and Approaches to Wind Power Integration and Mainstreaming</b> (Session Chair, <b>Mr. Pramod Jain</b> , Senior Consultant, United States of America)
	Future of Integration of Variable Sources of Generation (integration wind, pV, and storage) demonstration projects ( <b>Mr. Yao Hongchun</b> , Chief Engineer China Electric Power Research Institute)
	Advances in Wind Power Control Technologies: Reactive Power and Voltage Control ( <b>Dr. Chen Ning</b> , Chinese Society of Electrical Engineering)
	Wind Power Forecasting Technologies ( <b>Dr. Cao Xiao</b> , China Electric Power Research Institute)
1:00–2:00 p.m.	<b>L U N C H – M a i n R e s t a u r a n t G r o u n d F l o o r</b>
<b>Afternoon Sessions</b>	
Session 6 2:00–3:30	<b>Issues and Challenges of Wind Power Dispatching</b> (Session Chair, <b>Mr. Geoff James</b> , CISIRO, Australia)
	Wind Energy Dispatching Methodology ( <b>Mr. Nick Miller</b> , GE Energy Management) <ul style="list-style-type: none"> <li>Wind farm as capacity source or energy source</li> <li>Policies for scheduling wind energy</li> <li>Policies for curtailing wind energy</li> <li>Comparison of different methods</li> <li>Software and other tools, processes for scheduling wind energy</li> <li>Role of wind energy forecasting</li> </ul> <p>Chinese Experiences on Wind Power Dispatching (<b>Dr. Fan Gaofeng</b>, Chief Engineer, National Dispatch Center, State Grid Corporation of China)</p> <ul style="list-style-type: none"> <li>Methodologies and tools used for dispatching wind</li> <li>Energy storage technologies</li> <li>Intelligent DSM technologies using smart grid technologies</li> <li>Prediction of consumer demand and wind power output</li> </ul>
3:30–3:45	<b>C O F F E E / T E A B R E A K</b>
Session 7 3:45–4:45	<b>Panel Discussion Followed by Q &amp; A Session on the Technical Issues of Wind Power Integration</b> (Session Chair, <b>Mr. Pramod Jain</b> , Senior Consultant, USA) and the panel members consists of Mr. Nick Miller, Mr. Geoff James, Dr. Chi Yongning, Dr. Zhu Lingzhi and Dr. Fan Gaofeng )



# Regional Workshop on Large Scale Wind Power Integration

Beijing, China. Sept 23-26, 2013.

Wind Power has become an important source of electricity in China, India, EU and the US. In several countries it is the largest source of new generation. The primary reasons for the rapid expansion are favorable policies and cost competitiveness of wind energy compared to conventional generation.

As the penetration of wind energy into the electricity grid has grown, integration of wind energy has become a prominent issue. Unlike conventional generators, wind energy is a variable source of power, which poses unique technical challenges. The challenges are specific to the grid in the region or country. Experiences in regions/ countries with high penetration of variable generation have shown that variable generation of 30%-plus of peak load can be accommodated.

Although solutions differ based on legacy generation and infrastructure, some of the common elements of solution are: More transmission, flexible generation, demand response, cooperation between large interconnected systems and control areas, flexible grid operations, wind forecasting, grid-friendly variable generation technologies, and policies favorable to variable generation. In regions and countries with high level of variable generation in the grid, these solutions are being implemented and the penetration of wind continues to grow.

The question now is not “if wind/solar can be integrated”, but “what is required to integrate wind/solar into my grid.”

This Wind Integration Workshop will address two fundamental questions:

1. How are the capabilities of grid analyzed with regards to ability to accommodate various levels of variable generation?
2. What kinds of solutions can be used to accommodate higher levels of variable generation?

The workshop is organized into 6 technical sessions:

1. The first session will present the status of and approaches adopted by countries with high wind power installations: China, USA, India and Australia. The issues faced by these countries, evolution of solutions to address the issues and the lessons learned will be discussed in this session by presenters from the four countries.
2. The second session will present long-term strategic system-wide analysis to determine the requirements in order to achieve higher penetration of variable generation. It will discuss the methods/tools used for analysis, the outcome/revelations of the analysis and the proposed solutions. Experiences in various markets including US and China will be presented. The following questions will be answered: What is the acceptable level of penetration of wind power into a grid? What factors determine the level of penetration— why are some grids able to absorb higher percentage of energy from wind? How can the level of penetration of wind power be increased? What is the cost of higher levels of penetration of wind?

3. The third session will focus on grid code for interconnecting variable generation. It will describe experiences with various elements of the grid code in different markets. The current status of grid code in China, its shortcomings and proposed improvements will be presented. The following questions will be answered: What are the requirements to make wind power plants grid friendly? What power quality issues must be addressed by wind energy? What types of data should the wind plants provide to dispatch center?
4. The fourth session will present the system impact studies for proposed wind farms. These studies are performed to understand the impact on reliability, safety and stability of the power system due to injection of variable power at a specific point of connection. The methodology, data requirements, output and limitations of the studies will be presented. The following questions will be answered: What is the impact on system stability due to wind power? What is the impact of rapid ramping up or down of wind energy generation on the grid? How is the power flow in a grid impacted with high wind energy production and low demand? What changes must be made to the grid to accommodate wind energy?
5. The fifth session will present operational matters related to dispatching variable generation. Methods for managing day-, hour- and minute-level scheduling with variable generation will be presented. Experiences of wind power dispatching in US and China will be discussed. The following questions will be answered: Is wind energy dispatchable? What methods are used by grid operators to schedule wind into in 24-hour, and hour-to-hour time window? How well can wind energy be forecasted? How much spinning reserves are needed to support variability of wind energy?

In the sixth session, emerging technologies and methods related to integrating variable generation into the grid will be presented. Role of storage technologies, wind energy forecasting and advances in control technologies will be discussed.