

Power Sector Roundtable 7<sup>th</sup> Workshop  
**Green Olympics: Renewable Integration in Jing-Jin-Ji by 2022**  
July 2016

On July 5<sup>th</sup>, 2016, the Natural Resources Defense Council (NRDC) and Paulson Institute jointly hosted the seventh workshop of the Power Sector Roundtable, themed *Green Olympics: Renewable Integration in Jing-Jin-Ji by 2022*. The workshop was attended by the National Energy Administration, National Reform and Development Commission (NDRC) Energy Research Institute, China National Renewable Energy Center, State Grid Energy Research Institute, officials from the Beijing and Zhangjiakou municipal governments, Paulson Institute, NRDC, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and Regulatory Assistance Project (RAP).

The attendants had an extensive discussion about the high curtailment rate of renewable energy in the Jing-Jin-Ji (JJJ) region, and offered advice from international experiences. During the workshop, Paulson Institute released a report titled *Going for Gold – Championing Renewable Integration in Jing-Jin-Ji: Best Practices from Germany and Texas*.

#### **1. BACKGROUND**

The Chinese renewable energy industry leapfrogged in recent years in terms of generating capacity, equipment manufacturing and industrial services infrastructure. Meanwhile, the JJJ region's electricity system faces numerous challenges and is in need of short- and long- term system enhancement goals. In the short-term, the high renewable energy curtailment rates must be significantly reduced so that the 2022 Winter Olympics to be held in the region could be made more environmentally sustainable. In the longer term, growth in renewable energy integration implicates mid- to long-term planning to support the ongoing power sector reform and the restructuring of the electricity generation fuel mix.

#### **2. KEY WORKSHOP TAKEAWAYS**

During the 7<sup>th</sup> PSR Workshop, Shi Lishan, the deputy head of the New and Renewable Energy Department at NDRC delivered the opening speech, followed by a presentation by the Paulson Institute on its latest research on grid integration of renewable energy in the JJJ region featuring learnings from Germany and Texas. Later, the deputy director of China National Renewable Energy Center and director of the Renewable Energy Development Center at NDRC, Ren Dongming, delivered the keynote speech titled *The Opportunities and Challenges in Grid Integration of Renewable Energy*, after which the workshop attendants had an extensive discussion on that topic.

#### **Challenges ahead**

Several challenges are present in select Chinese provinces in integrating renewable energy, especially wind and solar:

### **Generation**

- a. The tension between conventional energy sources and renewable energy: the expansion of renewable energy is undercutting the market growth potential of conventional energy sources. Market competition and the conflict of interest between new and conventional energy sources would only intensify in the context of the current lack of new electricity demand growth.
- b. Electricity System Operations: the generation quotas of coal-fired generators are crowding out the annual hours of utilization of renewable generation assets.

### **Transmission**

- c. Lack of coordination among various levels of government: Interprovincial power transmission involves communications between local and central governments and coordination amongst local governments. The current lack thereof renders the interconnection of power grids considerably difficult. Furthermore, China is yet to establish a fully functioning electricity market and related coordinating systems, adding to the complexity of matching electricity demand and supply across jurisdictions.
- d. The incompatibility of the transmission and distribution networks and generation capacity: the build-out of transmission and distribution networks fall behind the rate of growth of renewable generation capacity, resulting in the inability of the former to fully absorb the electricity from the latter.

### **Building an electricity market**

- e. Electricity Pricing: Real-time pricing is able to timely adjust power demand and supply volumes, where generation technologies with lower marginal costs are dispatched first. However, the current pricing mechanism cannot reflect the changing values of electricity in different time periods, thus preventing wind and solar energy from being given the priority in dispatch.
- f. The building of an electricity market: the difficulty lies with building a spot market. The existing power trading center is presided by the government and not separated from the state-run grid companies, thus lacking applicability to a wider range of power generators.

### **International experience**

High renewable curtailment rates impact the economics of renewable energies. In *Going for Gold – Championing Renewable Integration in Jing-Jin-Ji: Best Practices from Germany and Texas*, Paulson Institute finds that at similar levels of electricity demand and wind and solar generation capacity, Germany and the U.S. state of Texas have far lower curtailment rates than the JJJ region. Curtailment in Texas dropped from 17% in 2009 to below 1% currently, during which time the state's renewable generating capacity doubled. The rapid grid integration of renewables in Texas, according to Max Dupuy from RAP, is due to the state's economic dispatch of electricity, where renewable energy options with near-zero marginal production cost help to lower overall electricity prices and thus are favorably utilized. Sandra Retzer, head of the Sustainable

Urbanization, Transportation and Energy Program at GIZ China, pointed out that the growth of renewable energy consumption and the concurrent reduction of curtailment is in part due to the construction of long distance transmission networks connecting Germany's north (the country's renewable generation base) and south, and in part due to Germany's collaboration with other European countries.

### **Renewable energy integration in the JJJ region**

The opportunities are in the below two aspects:

- The region is able to consume renewable electricity generated locally, because the region's load centers are close to the generators.
- The region possesses an interconnected electric grid, thus laying solid infrastructural foundation for renewable energy integration into the grid.

The challenges for the host cities of the 2022 Winter Olympics to integrate more renewable energy are in the below two aspects:

- Beijing needs to further explore consumption potentials in the demand side, for example, to utilize wind energy for municipal heating in off-peak hours.
- Zhangjiakou faces a situation where large-scale financing is required to build low-carbon energy infrastructure. Meanwhile, government subsidies to lower the high electricity prices would burden the local public budget.

### **Potential solutions**

- To slash curtailment, explore the feasibility of a regional electricity spot market and the economic benefits of prioritizing the dispatch of renewable energies.
- Integrate the planning of renewable power supply and transmission networks across the three jurisdictions (Beijing, Tianjin, Hebei) in the JJJ region.
- Paulson Institute suggests treating JJJ region as a national renewable integration pilot and setting a goal for curtailment reduction in this pilot: down to 3% by 2022.
- Construct real-time power dispatch across the JJJ region. The business models of the grid companies may be transformed.

### **Recommendations for future research**

- Implement demand side management using incentives such as real-time electricity pricing to enhance the flexibility of the electricity system.
- Match transmission and distribution capacity with generation capacity in order for the grid to absorb more renewable electricity.
- Mobilize policy support for effecting regional interconnection of power grids.
- The setting of bus-bar renewable electricity prices must reflect the real

cost of generation. Renewable energy subsidies should be phased down. Both measures serve to demonstrate the low marginal generation costs of renewable technologies as well as to spur the long-term investments in renewable energy. However, in a future electricity market, electricity prices will be cleared by market mechanisms instead of being determined by the government.

- Building spot and retail electricity markets entails making the marginal cost of renewable generation more transparent and implementing mechanisms to allow the market to determine when and how much electricity to generate from each technology. It also entails putting in place an ancillary services market in order to help reconcile the conflict of interest between renewables and coal power.
- The establishment of renewable portfolio standards warrants further research as a key approach to integrating more renewable electricity. Relevant topics include the use of renewable energy certificates and adjustments to the size of renewable energy portfolios as time progresses.
- Renewable energy policy incentives: the areas of focus are ways to augment the National Renewable Energy Fund, downsizing the Fund deficit, and mitigating the burden of renewable subsidies on government budgets.