U.S. Department of Energy
National Electric Transmission Congestion Study Workshop
San Diego, December 15, 2011

Questions from DOE and Comments from the California ISO

Panelists have been asked to address the following questions, with emphasis as each panelist deems appropriate:

1) In its 2009 Congestion Study, DOE found that Southern California constitutes a Critical Congestion Area, that the Portland-Seattle region and the San Francisco Bay Area were congestion areas of concern, and that the Phoenix-Tucson area was no longer a congestion area of concern. The study also identified parts of the West with rich renewable resource development potential as Conditional Congestion Areas. Do you think that the 2009 study came to the appropriate conclusions regarding congestion in this region in 2009-10? Based on current conditions, analyses and recent developments in your region, do you think your area has become more or less congested, and why?

Comments from Xiaobo Wang (California ISO):

In the DOE 2009 Congestion Study, the assessment of California transmission congestion was based upon the market conditions that existed in 2008. In 2009, the ISO launched a new market operations system, where the LMP model shifted from a zonal topology to a full nodal network. Under the current market design, grid congestion is managed very differently. With that, significant differences between the previous and current market designs make it impractical to compare the 2008 congestion (described in DOE 2009 study) with the 2009-2010 congestion.

Currently the ISO is seeing limited congestion on the system now, and that the congestion is being managed by our LMP market design to re-dispatch around the congestion. While there is some uncertainty in the future, it appears that meeting the state RPS objectives with minimal transmission needed beyond what is already under development is achievable. However, future procurement decisions may lead to the possibility of congestion and the need for additional transmission.

2) What factors should DOE look at when evaluating congestion and identifying congestion areas in this region? How might each factor affect future congestion in this region?

Comments from Xiaobo Wang (California ISO):

In addition to assessing past congestion, it is also very important to study future congestion under a number of potential load and generation development scenarios. For

the California system, congestion analysis is included in the ISO-published annual transmission plans. The congestion analysis is conducted under the framework of economic planning studies.

Regarding which factors affect future congestion in this region, a simple statement is: load and resources drive the transmission. More specifically, important factors include renewable build-out, once-through-cooling generation, demand-side management and energy efficiency. Those factors will play a large role in congestion analysis in this region. In assessing the potential for congestion it is important to identify areas where the congestion occurs in multiple scenarios.

3) Is there current or conditional congestion in your area or region today? What evidence -- quantitative or qualitative -- supports your conclusions regarding current or conditional congestion in your area or region today? (Please provide such evidence, or direct us to appropriate source materials.) To the extent that you believe your region has conditional congestion of national significance, what are the factors or conditions upon which that conclusion rests and how likely are these conditions likely to materialize?

Comments from Xiaobo Wang (California ISO):

The ISO interprets "conditional congestion", as used by the DOE, to the situation where proposed generation needs to be connected to the grid but there is lack of transmission.

Currently, there is more than 60,000 MW of active renewable projects in the ISO Generator Interconnection Queue. The capacity in the queue is more than three times the capacity (about 20,000 MW) needed to satisfy the California 33% RPS. While the ISO does not select which projects will be developed, it is likely that not all the generators in the queue will materialize.

Given the 33% RPS scenarios defined by the CPUC, adequate transmission is being planned. There are a number of major renewable transmission projects are already under construction (e.g. Tehachapi Renewable Transmission Project and the Sunrise Powerlink).

As indicated, within the capacity required for the 33% RPS, it is anticipated that there will be limited conditional congestion based on the current transmission plans. However, beyond the 33% RPS capacity requirements there could be significant conditional congestion with the current transmission development plans.

4) If current or conditional congestion exists in your area, what are its consequences in terms of reliability, resource options, wholesale competition and market power, cost of electricity to consumers, environmental quality, or other? Are these consequences so significant that this congestion should be mitigated?

Comments from Xiaobo Wang (California ISO):

In renewable transmission planning, the ISO conducts studies for a range of RPS scenarios defined by the CPUC. In this manner, the transmission planning takes into account different scenarios of renewable build-out and provides corresponding transmission solutions. At the same time, all interconnection requests are studied under the ISO generator interconnection process, where transmission is proposed to reliably interconnect and deliver the new generation.

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The congestion that does exist in the operation of the ISO grid, it is addressed through the real time operation of the LMP market.

5) Assuming that it would not be economic or practical to mitigate all congestion, what is the range of options for mitigating severe congestion?

Xiaobo Wang (California ISO):

The ISO applies a structured approach to address basic reliability needs, policy needs (through projections of renewable energy development), then assessing remaining opportunities for projects driven strictly by economic dispatch considerations. This is done through the ISO's annual transmission planning cycle. If there is congestion that remains, it is addressed through the real time operation of our LMP market.

6) Are there particular data sources, analyses and organizations that DOE should look at for expertise and source material in preparing the 2012 congestion study? In particular, how should DOE best use the expertise and insight offered by the Western Governors Association (WGA) and the Western Electric Coordinating Council (WECC)? What are the most relevant results from recent work, such as that done for the Western Renewable Energy Zones project, the designation of energy corridors on federal lands under section 368 of the Energy Policy Act (2005), the programmatic environmental impact statement for solar development on federal lands, and WECC's recent 2011 10-Year Regional transmission Plan?

Comments from Xiaobo Wang (California ISO):

On the regional level, WECC conducts congestion studies for 10-year planning horizon. On a sub-regional level, the ISO conducts congestion studies for 5-year and 10-year planning horizon. The ISO congestion studies also use the WECC production cost model, but the ISO studies drill down into details of the California transmission system. For congestion

occurred in the past, the DOE can continue to refer to the ISO market monitoring reports that are published annually.

Biography

Xiaobo Wang graduated from Tsinghua University Beijing in 1988 with a M.S. degree in electrical engineering and from Technical University Berlin in 1997 with a PhD degree also in electrical engineering. Dr. Wang has over 23 years of professional experience in the power industry. His career history includes 3 years at Tsinghua University as an assistant professor, 7 years at SIEMENS Germany as a consulting engineer on transmission planning, 7 years at ABB US as a senior development engineer on market operations products, and 7 years at the California ISO as a Sr. Regional Transmission Engineer.