Power Systems Engineering Research Center

Transmission Design at the National Level: Benefits, Risks and Possible Paths Forward

James D. McCalley
Professor, Electrical and Computer Engineering
Iowa State University

PSERC Public Webinar
Tuesday, January 24, 2012
2:00-3:00 p.m. Eastern Time (11:00-12:00 p.m. Pacific)
[Note: a poster on this work is available on the PSERC website: Dec. 7 Workshop Poster, PDF 583KB. The white paper associated with this webinar will be available on the PSERC website in advance of the webinar.]

Description

Today, the ability to move electric energy interregionally is limited to the capacity of the existing transmission system, a system designed largely to serve intraregional needs from fossil- and nuclear-based generation for which production costs are relatively flat from one region to another. In contrast, the levelized cost of energy production for renewables (wind, solar, and deep geothermal) varies dramatically from one part of the country to another. Furthermore, unlike coal, natural gas, and uranium which may be moved electrically or in other ways (rail and truck, or for natural gas, by pipeline), the only way to move renewable energy is by electric transmission. These two attributes of renewables, the heavy influence of location on their economic viability, and their complete dependence on electric transmission for energy transfer, increases benefits derived from interregional transmission in future scenarios where renewables comprise an increased percentage in the national generation portfolio.

We define a national transmission overlay as a high capacity, multi-regional transmission grid that spans all three interconnections, designed as a single integrated system to provide economic and environmental benefits to the nation. The objective of this webinar and associated white paper is to identify benefits to building a national transmission overlay, to lay out essential elements to facilitate continued dialogue on this topic, and to frame possible paths by which it could be realized. A preliminary study illustrated that a national transmission overlay, under high renewable penetration and low CO2 emissions, could result in cost-reduction of between a quarter trillion and a half trillion dollars over a 40-year period, while increasing infrastructure resilience and flexibility.

This webinar and white paper should not be perceived as either supporting or opposing development of a national transmission overlay but rather providing objective information to use in further considerations. This information indicates that a national transmission overlay has potential to offer significant net benefits to the nation, while the political, regulatory, and procedural difficulties associated with initiating it are formidable. We conclude that development of a national transmission overlay merits further attention through discussion and analysis regarding benefits, risks and impediments, and possible paths forward. This work can serve as a reference that gathers the essential elements to facilitate continued

dialogue on this topic and to frame possible paths by which it could be realized. The next step in the effort will be to convene a group of experts spanning various dimensions of the issues who would expand and refine the work reported here and who would provide recommendations on the extent to which a national transmission overlay should be further pursued.

This webinar is based on one of nine white papers under development in the project "The Future Grid to Enable Sustainable Energy Systems: An Initiative of the Power Systems Engineering Research Center." This project is funded by the U.S. Department of Energy. More information about the Future Grid Initiative: available on the PSERC website.

Biography: James D. McCalley received the B.S., M.S., and Ph.D. degrees in electrical engineering from Georgia Institute of Technology, Atlanta, in 1982, 1986, and 1992, respectively. He was with Pacific Gas & Electric Company, San Francisco, CA, from 1985 to 1990 as a Transmission Planning Engineer. He has been an IEEE fellow since 2004 and is now the Harpole Professor of Electrical and Computer Engineering at Iowa State University, Ames, where he has been employed since 1992.

Speaker Contact Information: James McCalley, jdm@iastate.edu

Participation by Webinar: To connect to the webinar, click here and then on 1/24/2012. The webinar will include the audio and slides. You will be able to send in your questions via the website. The archived webinar will be available immediately afterwards.

Registration for Webinar Participation: None required. There is no charge for participating!

Webinar Technical Details: To confirm that you will be able to view the webinar, click here and try viewing one of the archived webinars. You should install Silverlight 3 to view the webinar. If the video or audio stop during the presentation, try refreshing your browser page.

Assistance: If you have any questions, please call 480-965-1643 or email pserc@asu.edu. You can also contact Dennis Ray, PSERC Deputy Director, at 608-265-3808 or djray@engr.wisc.edu.

PSERC's Webinar Coordinator
Ward Jewell, Wichita State University
Email: ward.jewell@wichita.edu
Ward welcomes feedback on the webinars and suggestions for future ones.