

Cross-border Energy and Capacity Trading

Intra- and international experiences in the Western Interconnection

August 20th 2018

Hyatt Regency Long Beach, Seaview B & C

200 South Pine Avenue

Long Beach, California, USA

(Held on the side of the [Electrification 2018](#) international conference)

Power system integration can be a tool for improving electricity security, reducing system costs, and enabling the integration of variable renewable resources. For example, rising penetrations of variable renewable generation in the Western Interconnection is driving increased regional collaboration, for example through the development of the Western Energy Imbalance Market (WEIM). One question that has arisen is the extent to which the potential benefits of regional collaboration would extend to greater integration of Mexico's Baja California power system with the California Independent System Operator (CAISO) system in the United States.

In this context, the International Energy Agency (IEA) and Electric Power Research Institute (EPRI) are jointly organizing a workshop to better understand the state of integration of the Mexican Wholesale Market and CAISO, and to engage in a broader discussion on the question of cross-border power system integration. This workshop will engage relevant stakeholders to discuss opportunities from and obstacles to further integration, while also allowing other relevant IEA member countries to learn from the CAISO-Mexico example, and bring their own experiences to bear.

Background

The first stage of the IEA's work on "Electricity Security Across Borders" has focused on a "stock-taking" exercise in the form of a series of case studies. Two common elements have emerged from these case studies. First, successfully integrating large shares of variable renewables requires increased real-time cross-border collaboration. Second, there is a growing interest in establishing the trade of *capacity* across borders. Capacity trading is of particular relevance to the question of electricity security, as without trade in capacity jurisdictions are less likely to rely on their neighbours to meet system needs in times of stress. This can lead to overdevelopment of domestic or local capacity, which can in turn impact the cross-border trade of energy.

Through the organisation of this workshop, the IEA and EPRI seek to highlight lessons learned through various case studies to an audience interested in better understanding the potential impact of cross-border capacity trading. The IEA and EPRI will encourage input from Mexico, the United States, and a relevant group of expert stakeholders, allowing these lessons learned to not only inform the question of cross-border energy trading along the U.S. Mexico border and elsewhere.

The meeting will be informal in nature and held under [Chatham House Rule](#). Attendance is by invitation only.

	<i>Followed by a discussion</i>
12:30 – 13:30	LUNCH
SESSION 3 CROSS-BORDER ENERGY TRADING: PART 2	
13:30 – 15:00	<p>This session continues the discussion on cross-border energy trading, building on the conversation from the previous session and bringing in new voices.</p> <p><i>Moderator:</i> Matthew WITTENSTEIN, Senior Electricity Analyst, IEA</p> <p><i>Panellists:</i></p> <ul style="list-style-type: none"> • Development of the WEIM: Drivers of integration and technical challenges Mark ROTHLEDER, Vice President, Market Quality and Renewable Integration, CAISO • Regulatory and policy drivers of cross-border integration Scott MILLER, Executive Director, Western Power Trading Forum • Canada and the WEIM Mike MACDOUGALL, Vice President, Trade Policy and IT, Powerex <p><i>Followed by a discussion</i></p>
15:00 – 15:30	COFFEE BREAK
SESSION 4 ESTABLISHING CROSS-BORDER CAPACITY TRADING	
15:30 – 17:00	<p>The final session of this workshop will present relevant experiences on cross jurisdictional capacity trading in order to provide insights on what would be required to establish cross-border capacity trading between Mexico and CAISO. Relevant examples will be brought in from US markets.</p> <p><i>Moderator:</i> Victor NIEMEYER, EPRI</p> <p><i>Panellists:</i></p> <ul style="list-style-type: none"> • Technical requirements for capacity trading: CAISO’s experience Mark ROTHLEDER, Vice President, Market Quality and Renewable Integration, CAISO • Capacity trading between ISOs/RTOs – technical requirements and existing procedures Craig GLAZER, Vice President – Federal Government Policy, PJM • Technical and legal changes required to import capacity to Mexico Ivan CAJEME VILLARREAL, Secretaría de Energía de México (SENER) • Reliability coordination services in the Western interconnection Richard DILLON, Director, Market Policy at the Southwest Power Pool <p><i>Followed by a discussion</i></p>
17:00	Closing remarks
FOLLOWED BY A RECEPTION (POOLSIDE DECK)	

BIOGRAPHIES



Peter FRASER

Head of Division, Gas, Coal and Power Markets
Directorate of Energy Markets and Security
International Energy Agency (IEA)

Peter Fraser is a Canadian national and has re-joined the International Energy Agency in December 2016 as Head of the Gas, Coal and Power Markets Division. This is his second sojourn with the IEA, having been a Senior Electricity Policy Advisor there from 1998-2004.

In between, Mr. Fraser worked at the Ontario Energy Board, the energy regulator in the Canadian province of Ontario, most recently as Vice President, Consumer Protection and Industry Performance. From 1989-98, he was an energy policy advisor at the Ontario Ministry of Energy. Mr. Fraser holds master's degrees in physics from Queen's University and in environmental studies from York University and a BSc in physics from the University of Toronto.



David HUNTER

Senior Government and External Representative
External Relations and Technical Resources
Electric Power Research Institute (EPRI)

Dr. David Hunter is Senior Government and External Representative at the Electric Power Research Institute (EPRI). He has the principal responsibility at EPRI for federal relations, where he has focused on a variety of issues including electrification, energy analytics, decarbonisation, the energy-water nexus, renewable energy, resiliency, and pollinators.

Dr. Hunter has more than 20 years' experience in energy and environmental policy. Prior to joining EPRI, he was the founding US Director of the International Emissions Trading Association and ran IETA's state, regional, and federal programs at a time when emissions trading was one of the top two domestic issues in the US. He was a frequent national and international speaker on carbon policy and has been quoted multiple times in the New York Times.

Dr. Hunter spent 9 years on Capitol Hill, where he was Staff Scientist for the Senate Homeland Security and Governmental Affairs Committee, the principal energy and environment advisor to Senator Susan Collins of Maine, and a Congressional Fellow. He played a significant role in crafting US Energy Policy in the mid and early 2000's, including shaping the Energy Policy Acts of 2003 and 2005. He was Executive Editor of the Journal of Environment and Development, Department of Energy Global Change Fellow at the White House Office on Environmental Policy and Council on Environmental Quality, and spent a year studying atmospheric aerosols at Brookhaven National Laboratory. He has a Ph.D. in Earth Science from the Scripps Institution of Oceanography and a B.S. in Natural Resources from Cornell University.



Matthew WITTENSTEIN

Senior Electricity Analyst
International Energy Agency (IEA)

Matthew Wittenstein joined the International Energy Agency's Gas, Coal and Power Markets Division in 2014. As a senior electricity analyst, he focuses on the economics of generation, the challenges of encouraging investment in clean energy technologies, and electricity market design. He was a lead co-author of the 2015

Projected Costs of Generating Electricity study, the Development Prospects of the ASEAN Power Sector report, and the IEA's 2016 Thailand Electricity Security Assessment. Mr. Wittenstein is currently leading the IEA's work on cross-border electricity security.

Prior to joining the IEA, Mr. Wittenstein was a Fellow in the US Department of Energy's International Climate Change Office, where he supported the Clean Energy Ministerial, a global forum dedicated to sharing best practices and promoting policies and programs that encourage and facilitate the transition to a global clean energy economy. In his role, Mr. Wittenstein chaired the incentives working group of the Super-efficient Equipment and Appliance Deployment (SEAD) initiative, and managed the 21st Century Power Partnership, a platform for public-private collaboration to advance integrated policy, regulatory, financial, and technical solutions for the large-scale deployment of renewable energy and energy efficiency, as well as smart-grid technologies. Mr. Wittenstein holds a Masters of International Affairs from Columbia University, with a concentration in international economic policy.



John TABER

Technical Leader
Electric Power Research Institute

Dr. John Taber is a Technical Leader in the Energy and Environmental Analysis Research Group at the Electric Power Research Institute (EPRI). His research areas include the impact of environmental policies on the evolution of the power system, modeling state policy in electricity system planning, and the interaction of markets and grid resiliency and reliability. Before

joining EPRI, Dr. Taber worked for the Federal Energy Regulatory Commission as an Economist in the Office of Energy Policy and Innovation, where he focused on quantitative analysis of recent and proposed policy changes. He has also served as an adjunct professor at the University of Maryland and Georgetown. John holds a Bachelor of Science in Physics and a Bachelor of Arts in Economics from The Ohio State University and a Master's of Science and Doctorate in Applied Economics and Management from Cornell University.

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Greg BRINKMAN

Principal Investigator
North American Renewable Integration Study
(NARIS)

Greg Brinkman is an expert in power system operational modelling at the National Renewable Energy Laboratory. His research over the past decade has focused on modelling unit commitment and dispatch of the power system in scenarios with high penetrations of variable renewable resources. The key goal of this work is to understand the impacts on

economics, resource adequacy, and operations at existing generators. He is currently the Principal Investigator on the North American Renewable Integration Study (NARIS), which is a coordinated effort between the US Department of Energy, Natural Resources Canada, and the Ministry of Energy in Mexico (SENER). Greg has worked on several large renewable integration studies, including the Western Wind and Solar Integration Study and the California Low Carbon Grid Study.



Dennis Best

Researcher, Renewable and Appropriate Energy Laboratory
(RAEL)

Dennis has focused his career on technology and sustainability policy in emerging and developing economies. His research interests include technology and innovation policy and impacts to resource and rural development, technology transfer and the political economy of land use management. He has led programs with the Paris based International Energy Agency, as an official of the OECD, working with emerging economies on energy technology policy and contributing to the Agency's analysis of

energy, environment and climate policies (specifically working collaboratively with China and other transition economies in exploring long-term clean energy options, including advanced bioenergy, carbon sequestration and negative emissions systems.) Prior to living in Berkeley, he spent five years in France, and seven years in Beijing, China – advising government and industrial clients on sustainability and technology deployment initiatives. He holds a BA in political science (international relations) and a concentration in East Asian studies from the University of California, Los Angeles (UCLA).



Roberto A. BAYETTI

CASIO-Director Security, Architecture QAT and Model Management

Education: Electronic Engineer (PMP)

PROFESSIONAL EXPERIENCE:

38 years on the electrical utility industry as engineer, consultant and vendor.

- 1980 to 1995: Electrical utility in Venezuela (CADAPE). Multiple positions on the control centres and operations.

Last position: Head of the National Control Center

- 1995 to 1999: Working with SIEMENS on the Control; centre business operations and projects.

Last position held: Director of Operations for the US offices

- 1999 to 2011: Consulting services (KEMA consulting) for multiple projects related to Control Centres, Smart Grid, DOE, Market systems

- 2011 to present: CAISO as Director of Information Security, Architecture, quality assurance (QAT) and Model Management.

- Developed SCADA system on PC sold internationally

Personal: Born in Venezuela

Languages: English, Spanish and Italian

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Marcos VALENZUELA

Marcos Valenzuela Ortiz received a degree in Electromechanical Engineering from the ITR of Tijuana (1979) and a master's degree in Electrical Power Systems from UANL (1992). Marcos has extensive experience in the area of analysis and operation of power systems and in the development and management of energy contracts. He has had substantial interaction with U.S. and Canadian companies in developing energy transactions for the Baja California electrical system. He has been working in the CENACE group in the implementation of the wholesale electricity market in Mexico.



Mark ROTHLEDER

Vice President

Market Quality and Renewable Integration

California Independent System Operator Corporation

Mark Rothleder is Vice President, Market Quality and Renewable Integration at the California Independent System Operator Corporation and is leading the ISO's renewable integration work. Mr. Rothleder has held several critical positions at the ISO after joining the grid operator as one of its first employees in 1997. He is currently the longest serving ISO employee. Before being named vice president, he was Executive Director of Market Analysis and Development. His previous positions included

Principal Market Developer and Director of Market Operations.

In spring 2009, Mr. Rothleder led a multifunctional team in designing and implementing market rules and software modifications related to the ISO's Market Redesign and Technology Upgrade (MRTU). Since joining the ISO nineteen years ago, Mark has worked extensively on implementing and integrating the approved market rules for California's competitive wholesale energy and reserves markets.

Mr. Rothleder is a registered Professional Electrical Engineer in the state of California and holds a B.S. degree in Electrical Engineering from the California State University, Sacramento. He has taken post-graduate coursework in Power System Engineering from Santa Clara University and earned an M.S. in Information Systems from the University of Phoenix. Prior to joining the ISO, Mr. Rothleder worked for eight years in the electric transmission department of Pacific Gas and Electric Company, where his responsibilities included operations engineering and transmission planning & sub-station design.

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Scott MILLER

Executive Director

Western Power Trading Forum

Scott Miller became the "incoming" Executive Director of WPTF in January of this year and assumed full responsibilities as Executive Director on July 1, 2018. WPTF is a broad-based organisation with over 80-member companies, dedicating to encouraging competition in Western states electric markets. Scott comes to this position from a background that has been dedicated to competitive electric and natural gas markets.

Prior to coming to WPTF, Scott was the Senior Market Advisor in the Policy Office at the Federal Energy Regulatory Commission (FERC) from 2008-2017. He was responsible for advising the Commission and staff on electric and natural gas markets.

- Scott worked as Vice President for Regulatory Affairs at Constellation Energy from 2006-2008.
- From 2002-2006 Scott was Executive Director for Market Development at PJM and later in charge of

relations with PJM's 13 states.

- From 2000-2002 Scott was Executive Director of the Energy Markets Division at FERC where he oversaw the FERC staff's first investigation into the Western Energy Crisis in 2000. Scott also directed staff investigation into the Cost-Benefit Study on participation in RTOs.
- Scott worked for US Generating Company and its successor, PG&E National Energy Group from 1994-2000, first as Assistant to the President & CEO and later as Director of Market Policy where he coordinated NEG policy on ISO and RTO formation across the US.

Scott began his career in Foreign Policy and National Security working at the US Department of State on Arms Control and Security Assistance.

Scott has a BA in History from Columbia University and an MA in Security Policy Studies from George Washington University.



Mike MACDOUGALL

Vice President, Trade Policy & IT
Powerex Corp.

Mike MacDougall is the Vice President, Trade Policy & IT for Powerex Corp. He has been at Powerex for 20 years and is a member of the Executive Team. During his tenure Mike has been actively involved in many aspects of the electricity industry, with particular focus on market design, transmission tariffs, business practices and the interplay between transmission rules and the energy markets they facilitate.

Mike leads a team of professionals that cover the many regions in North America where Powerex conducts its business. With respect to IT, Mike provides the link between the company's strategic business direction and the continued enhancement and evolution of the IT program.

Prior to joining Powerex, Mike spent 7 years in the Natural Gas Industry following the deregulation of interstate natural gas transmission and was responsible for rate design and contracts for a major Canadian Natural Gas Pipeline.



Victor NIEMEYER

Victor Niemyer retired from the Electric Power Research Institute (EPRI) in 2016 as a Senior Technical Executive. His career at EPRI spanned 38 years, where he led research in integrated resource planning, environmental risk analysis and economics, power trading analytics, power market asset valuation, and analysis of climate policy. In retirement Victor has continued to work with EPRI in developing the MX-REGEN power market simulation model for Mexico. He holds a B.A. in economics from the University of California and a Ph.D. in economics from the University of Texas at Austin.



Craig GLAZER

Vice President – Federal Government Policy
PJM Interconnection

Craig Glazer, vice president – Federal Government Policy, PJM Interconnection. In his capacity, Mr. Glazer coordinates all of PJM's regulatory and legislative policies before Congress, the Federal Energy Regulatory Commission, the United States Department of Energy and other federal agencies. Mr. Glazer also serves on the Board of PJM Settlement which undertakes all of the settlement functions of the PJM marketplace.

Prior to joining PJM, Mr. Glazer served as Commissioner and Chairman of the Public Utilities Commission of Ohio. Mr. Glazer oversaw Ohio's move toward deregulation of its telephone, natural gas, transportation and electric industries. He also chaired the state's Siting Board and served as a member of the Governor's Cabinet.

Mr. Glazer remains extremely active on national electricity issues. He frequently testified before Congress and the Federal Energy Regulatory Commission on development of Regional Transmission Organizations and the needs of the marketplace. Mr. Glazer served as a member of the Board of Directors of the National Association of Regulatory Utility Commissioners, Chairman of its International Relations Committee and a member of its Electricity and Energy Resources Committees. He also chaired the National Council on Competition in the Electric Industry, an interagency collaborative with brought together FERC, the state PUCs, the US Department of Energy, the US EPA and the National Council of State Legislatures.

He also has served as Chairman of the Board of Directors of the Northeast Midwest Institute, a bipartisan research arm of the Northeast and Midwest region's Congressional delegations and as a member of the Advisory Councils of the Electric Power Research Institute and the Gas Research Institute.

Mr. Glazer is a graduate of the University of Pennsylvania and the Vanderbilt University School of Law.

PJM Interconnection, founded in 1927, ensures the reliability of the high-voltage electric power system serving 61 million people in all our parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. PJM coordinates and directs the operation of the region's transmission grid, which includes 62,556 miles of transmission lines; administers a competitive wholesale electricity market; and plans regional transmission expansion I improvements to maintain grid reliability and relieve congestion. Visit PJM at www.pjm.com.



Ivan CAJEME VILLARREAL

Director General de Análisis y Vigilancia del Mercado Eléctrico
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EXPERIENCIA PROFESIONAL 10/2017 – Presente

Director General de Análisis y Vigilancia del Mercado Eléctrico
SECRETARÍA DE ENERGÍA

- Dirijo el diseño y la implementación de la regulación para el Mercado Eléctrico Mayorista (mercado spot; subastas de mediano y largo plazo; coberturas).
- Coordino los esfuerzos del regulador y el operador del Mercado para facilitar la transición de la empresa eléctrica del Estado (CFE) al nuevo esquema de la industria.

10/2016 – 09/2017 Director General Adjunto de Análisis de Políticas Públicas y Asesor de la Subsecretaría de Hacienda, SECRETARÍA DE HACIENDA Y CRÉDITO PÚBLICO

- Apoyé el desarrollo del Paquete Económico 2018, que incluye la elaboración de los Criterios y Pre-criterios Generales de Política Económica.
- Supervisé el cumplimiento de las metas fiscales para 2017; se lograron el primer superávit primario y reducción de la deuda en 10 años.

07/2015 – 08/2016 Administrador de Análisis, Planeación e Información, SERVICIO DE ADMINISTRACIÓN TRIBUTARIA

- Desarrollé un modelo para identificar abuso de outsourcing entre empleadores y evasión de impuestos laborales y propuse un nuevo modelo de devolución de IVA.
- Implementé y evalué experimentos conductuales para mejorar el cumplimiento fiscal; se redujo 30% la sobre-facturación en exportaciones a través de llamadas preventivas.

06/2013 – 06/2015 Asesor y Coordinador de Asesores del Subsecretario de Transporte, SECRETARÍA DE COMUNICACIONES Y TRANSPORTES

- Colaboré en el diseño y negociación del nuevo Convenio de Servicios Aéreos México-EEUU, en la reforma a la Ley del Servicio Ferroviario, en la creación de la Agencia Ferroviaria y en la apertura de EEUU al autotransporte de carga de largo recorrido.
- Fungí como enlace de la SCT con el Depto. de Transporte de EEUU y el Foro Intl. del Transporte (OCDE); obtuve la presidencia del Foro para México (2016).

01/2011 – 12/2012

Asesor del Secretario y del Subsecretario de Hacienda, SECRETARÍA DE HACIENDA Y CRÉDITO PÚBLICO

- Ayudé en la coordinación de los trabajos del Canal de Finanzas del G20 y organicé seminarios sobre la situación macroeconómica global y precios de materias primas.
- Contribuí en la planeación y programación de los Programas Prioritarios sobre Seguridad Ciudadana del Gobierno Federal para el Paquete Económico 2012.

EDUCACIÓN

2006 – 2010 Estudios de Doctorado en Economía, UNIVERSIDAD DE CHICAGO

Maestría en Economía, UNIVERSIDAD DE CHICAGO (2008)

2005 – 2006 Investigador Visitante, UNIVERSIDAD YALE

2003 – 2005 Maestría en Economía, EL COLEGIO DE MÉXICO (1er lugar de la generación)

1997 – 2001 Licenciatura en Economía, UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN



Richard DILLON

Director, Market Policy
Southwest Power Pool

Richard Dillon is the Director of Market Policy at Southwest Power Pool. He has been in the electric industry since 1985 at both integrated utilities and a Regional Transmission Organization. His experience has been in many aspects of the industry ranging from IT to forecasting and including market monitoring. Since 1999, Richard has been involved in the development of energy markets in ERCOT, MISO, and SPP. In his current role, he is responsible for the market policy of SPP.