Gerald P. Farano

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Jerry Farano is a partner in Gibson, Dunn & Crutcher's Denver office. He is a member of the firm's Energy, and Power and Renewables Practice Groups as well as its Mergers and Acquisitions Practice Group. He concentrates his practice on transactional matters in the energy industry, advising clients on domestic and international M&A, joint ventures, strategic alliances, and energy and infrastructure development projects.

Mr. Farano has considerable experience with energy-related mergers and acquisitions in the conventional and renewable power industries. During the course of his career, Jerry has advised strategic and financial buyers and sellers on the purchase, sale, or development of more than 10,000 MW of wind generation, 10,000 MW of solar generation, 4000 MW of nuclear generation, and 10,000 MW of fossil fuel generation assets having an aggregate value in excess of $100 billion. In the last five years he also has been involved with the development of some of the world's largest and most complex solar and wind projects and the world's largest carbon capture and sequestration/enhanced oil recovery project.

Jerry's practice includes advising clients on significant electric transmission and other energy infrastructure projects. He has been active in structuring, drafting, and negotiating agreements involving stock and asset sales; controlled and noncontrolled energy investments, joint ventures, project development, engineering procurement, and construction; and acquisition financing on behalf of domestic and multinational energy companies and state-owned enterprises.

Mr. Farano is ranked nationally as a leading Energy transactions lawyer by *Chambers USA: America's Leading Lawyers for Business* and by *The Legal 500* in Energy Transactions: Conventional Power and Energy: Renewable/Alternative Power.

Jerry has authored and coauthored many articles on the energy market and has been a member of *Law360's* Energy Editorial Advisory Board since 2015.

Representative Matters*

Conventional Fuel

- NRG Energy, Inc. in the sale to Cleco Corporate Holdings LLC (Cleco) of NRG's South Central business for a total purchase price and cash proceeds of $1.0 billion, subject to certain adjustments.
- South Carolina Electric & Gas Company in its acquisition from the LS Power Group of the 540 MW gas-fired Columbia Energy Center for $180 million.
- DTE Electric Company in its acquisition from the LS Power Group of the Renaissance Power Plant, a 732 MW simple-cycle natural gas facility, for approximately $240 million.
- NRG Energy, Inc. as lead M&A and financing counsel for its approximately $1.3 billion Petra Nova carbon capture and enhanced oil recovery project located southwest of Houston, Texas.
- Sempra Generation in its sale to a wholly owned subsidiary of Occidental Petroleum Corporation of its fifty percent interest in Elk Hills Power, LLC.
- Sempra Generation in the sale of all of the shares of two of its wholly owned subsidiaries, Frontier Utilities of North Carolina, Inc. and Penobscot Natural Gas Company, Inc. Frontier Utilities is the parent company of Frontier Energy, LLC, a natural gas local distribution company in western North Carolina, and Penobscot Natural Gas is the parent company of Bangor Gas Company LLC, a gas LDC in Maine.
- Sempra Energy in the indirect sale of its Facilities Management Company business to a portfolio company of Sowood Capital.
- Sempra Energy in the indirect sale of Sempra Energy Services Company to Honeywell International Inc.
- DTE Energy in the disposition by its MichCon Pipeline utility subsidiary to DCP Midstream Partners, L.P. of certain gas gathering assets in Michigan.
- Evercore Capital, Sansome Partners, Macquarie Essential Assets Partnership, GFIEnergy, and Trans-Elect, Inc. in the indirect sale for approximately $900 million of Michigan Electric Transmission Company to ITC Holdings, Inc. a NYSE traded company that was formerly in KKR's portfolio.
- Power generation company in Ohio its sale via auction of a 206MW gas fired peaker and a 480 MW gas fired peaker.
- State owned independent transmission company in connection with its acquisition of certain transmission technology assets.

- International energy services company in connection with its acquisition of an energy services and engineering company.

Renewable and Conventional Combined Portfolio

- NRG Energy, Inc. in its first-ever dropdown sale to NRG Yield Inc. of 3 projects, including 2 solar projects and one gas fired facility.

- NRG Energy, Inc. in its sale to Global Infrastructure Partners (GIP) of NRG's ownership in NRG Yield and NRG's Renewables Platform for cash proceeds of $1.375 billion, subject to certain adjustments.
- NRG Energy, Inc. in its sale to NRG Yield of NRG's interest in the following ROFO pipeline assets: 527 MW Carlsbad Energy Center and 154 MW Buckthorn Solar for cash proceeds of $407 million, subject to certain adjustments.

Nuclear

- Cameco Corporation in its investment in GLE, LLP, a laser uranium enrichment business jointly owned by Cameco, GE Energy and Hitachi.
- Investor owned utility in connection with the establishment of a joint venture with another investor owned utility for the development and construction of a nuclear generating facility in the Southeastern United States.
- A consortium of municipalities and cooperatives in their bid to purchase a minority share in an investor owned utility's nuclear plant in the Southeastern United States.

Solar

- NRG Energy, Inc. in its sale to NRG Yield Operating LLC of NRG Energy's remaining 51.05% interest in CVSR, which indirectly owns the CVSR solar facility.

- NRG Energy, Inc. in its acquisition of Pure Energies Group, a residential solar developer.

- NRG Energy, Inc. in its acquisition of Roof Diagnostics Solar Holdings, a residential rooftop solar developer and installer.

- NRG Residential Solar Solutions in its up to $200 million financing of its residential rooftop solar platform.

- NRG Energy, Inc. in its sale of the Agua Caliente and Utah utility-scale solar projects (311 net MW) to NRG Yield, Inc. for a cash consideration of $130 million, plus assumed non-recourse project debt of approximately $464 million, excluding adjustments for working capital.

- NRG Energy, Inc. in its acquisition from SunPower Corporation, Systems of the 250 MW California Valley Solar Ranch photovoltaic solar project, which closed in connection with a $1.3 billion loan from the U.S. Department of Energy's federal loan guaranty program.

- NRG Energy, Inc. in its investment into ProSun Solar Development Company, a joint venture with ProLogis pursuant to which ProLogis and NRG will be putting distributed generation on rooftops in up to 28 states. This investment also closed in connection with a $1.4 billion loan from the U.S. Department of Energy's federal loan guaranty program.

- NRG Energy, Inc. in its acquisition from US Solar Holdings of its 450 MW solar portfolio consisting of nine solar energy projects in Arizona and California.

- NRG Energy, Inc. in its acquisition from Eurus Solar Holdings of an interest in three solar energy projects in Avenal, California totaling approximately 48 MW.

- NRG Energy, Inc. in its acquisition and development of the 21 MW Blythe photovoltaic solar facility located in Blythe, California from First Solar, Inc.

- NRG Energy, Inc. in its acquisition from eSolar Inc. of a 500 MW portfolio of solar development projects in the southwestern United States.

- NRG Energy, Inc. in its $300 million equity investment in BrightSource Energy's 392 MW Ivanpah Solar Electric Generating System, the world's largest solar project under construction, which closed in connection with a $1.6 billion loan from the U.S. Department of Energy's federal loan guaranty program.

- NRG Energy, Inc. in its acquisition from FirstSolar, Inc. of the 290 MW Agua Caliente solar project in Arizona, the world's largest photovoltaic solar project under construction, which closed in connection with a $976 million loan from the U.S. Department of Energy's federal loan guaranty program.

- A Midwest utility in the development and implementation of a solar RFP process to support compliance with its state renewable portfolio standard.

- An independent power producer in its acquisition of a controlling interest in Psomas FMG, LLC in connection with the development of 11 megawatts of behind-the-meter distributed generation projects in California.

- An independent power producer in the tax-equity financing of 5 megawatts of behind-the-meter distributed generation projects in California and Arizona.

- A non-U.S. bank as placement agent, and one of its subsidiaries as acquiror, in the placement and acquisition of securities of a leading solar developer.

Wind

- NRG Energy, Inc. in its sale to NRG Yield Inc. of five power plants totaling 785 MW for $1.2 billion, including cash and assumed liabilities.

- NRG Energy, Inc. in its agreement to sell 75% of a portfolio of wind assets to NRG Yield, consisting primarily of assets acquired by NRG from Edison Mission Energy in 2014, for $210M in cash plus $145M in assumed project debt and approximately $97M in tax equity.

- NRG Yield, Inc. in its acquisition of the 950 megawatt Alta Wind portfolio located in Tehachapi, California for $870 million, plus the assumption of $1.6 billion of non-resource project financings and subject to customary working capital adjustments.

- DTE Energy in DTE Electric Company's purchase from NextEra of the 75MW Pheasant Run 2 wind farm.

- Sempra Generation in its acquisition from BP Wind Energy North America of a fifty percent interest in the development of the 250 MW Cedar Creek II Wind Farm in Colorado.

- Sempra Generation in its acquisition from BP Wind Energy North America of a fifty percent interest in the development of the 200 MW Fowler Ridge II Wind Farm in Indiana.

- Sempra Generation in its sale to BP Wind Energy North America of a fifty percent interest in the development of the 22 MW Auwahi Wind Farm in Hawaii.

- Sempra Generation in its acquisition from BP Wind Energy North America of a fifty percent interest in the development of the 140 MW Mehoopany Wind Farm in Pennsylvania.

- Sempra Generation in its acquisition from BP Wind Energy North America of a fifty percent interest in the development of the 420 MW Flat Ridge 2 Wind Farm in Kansas.

- DTE Energy in The Detroit Edison Company's purchase of 100 MW of the Gratiot County Wind Farm from Invenergy.

- DTE Energy in the acquisition by the Detroit Edison Company of the Minden Wind Energy Project from BP Wind Energy North America, Inc.

- DTE Energy in the acquisition by the Detroit Edison Company of certain wind leases and related assets from Heritage Sustainable Energy, LLC and Wind Energy Partners, LLC and associated development of a wind energy project in Huron County, Michigan.

- DTE Energy in the negotiation of a turbine supply agreement pursuant to which The Detroit Edison Company purchased wind turbines for three wind projects it is developing in Michigan.

Development

- Competitive Power Ventures Inc. in connection with the negotiation and drafting of an O&M agreement with Siemens Energy, Inc. and UpWind Solutions, Inc. for continued development of Competitive Power Venture's Keenean II wind farm in Oklahoma.

- A major independent renewable power developer in the negotiation of an EPC Contract for an approximately 150 MW PV solar facility in the Midwestern United States.

- Two major corporations in the procurement of renewable energy via VPPAs in SPP and MISO respectively.

Education

Mr. Farano earned his Juris Doctor in 1991 from George Washington University School of Law. He received an LL.M. in taxation from Georgetown University in 1992. He graduated in 1988 from Bucknell University, where he received a Bachelor of Arts degree in political science.

* *Includes matters handled prior to joining Gibson, Dunn & Crutcher*

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Melissa L. Persons is an associate at Gibson, Dunn & Crutcher LLP and is a member of the firm's Corporate Department and practices in the Capital Markets, Mergers and Acquisitions, and Energy and Infrastructure Practice Groups.

Ms. Persons' practice focuses on mergers and acquisitions, private equity investments, and advising clients in the oil and gas, energy and infrastructure industry.

Ms. Persons received her law degree in 2009 from the SMU Dedman School of Law, where she was a member of the Dean's List. While in law school, she served as Articles Editor of the SMU Law Review. She earned her Bachelor of Science in chemistry, with a concentration in biochemistry, from Duke University in 2005.

A member of the Dallas Bar Association, Ms. Persons is admitted to practice in Texas and before the U.S. District Court for the Northern District of Texas.

Representative Experience*

Domestic U.S.

- Counsel to **Williams Companies** the sale of its olefins plant in Geismar, Louisiana to NOVA Chemicals for $2.1 billion.
- Counsel to **American Midstream Partners** in pending $815 million acquisition of Southcross Energy Partners and substantially all of the assets of Southcross Holdings.
- Counsel to **Encino Energy** in connection with the $1.0 billion equity commitment by Canada Pension Plan Investment Board in Encino Acquisition Partners.

- Counsel to **Williams Companies** in connection with its $50 billion merger with Access Midstream Partners, L.P.

- Counsel to **Luminant Holdings** in its agreement to acquire natural gas generation facilities from NextEra Energy for approximately $1.3 billion.

- Counsel to **Woodbine Holdings** in its sale of its E&P assets in the Woodbine Shale for approximately $140 million.

- Counsel to **Woodbine Holdings** in its sale to a Chinese buyer for approximately $560 million.

- Counsel to **TEAK Midstream** in the sale of its pipeline and natural gas processing plants in the Eagle Ford Shale to Atlas Pipeline Partners LP for $1 billion.

- Counsel to **Saddle Butte Pipeline** in connection with the sale of its Williston Basin crude oil pipeline and terminal system and natural gas gathering and processing operations to Targa Resources Partners for $950 million.

- Counsel to **Chief E&D Holdings** in the sale of its Marcellus Shale pipeline system toPVR Partners for $1 billion.

- Counsel to **Cardinal Midstream** in its acquisition of Woodford Shale Assets for $268 million.

- Counsel to **GAIL India** in its joint venture with Carrizo Oil & Gas.

- Counsel to **Meritage Midstream Services** in its sale of Eagle Ford Shale assets.

International

- Counsel to **Murphy Oil Corporation** in connection with the sale of 30% of its participating interests in several exploration and producing PSCs in Malaysia to PT Pertamina (Persero) for a consideration of $2 billion.

- Counsel to **PT Medco Energi Internasional Tbk** in connection with the acquisition of the shares in Lundin Indonesia Holding B.V., which has interests in several PSCs in Indonesia.

- Counsel to **Murphy Oil Corporation** in connection with the farm-in to a 50% participating interest and operatorship in the Deepwater Block 2C PSC in Malaysia from SapuraKencana, Mitsubishi Corporation and PETRONAS Carigali Sdn. Bhd.

- Counsel to **Murphy Oil Corporation** in connection with the acquisition of a 40% participating interest and operatorship in the Deepwater Block 2A PSC in Malaysia from BHP Billiton Petroleum.

**Includes matters handled prior to joining Gibson, Dunn & Crutcher LLP*

John Colella

Managing Director,
Power, Utilities, & Infrastructure

- John Colella is a Managing Director at Moelis & Company where he focuses on transactions in the power and utility sectors. He joined the Firm with expertise in several energy sectors including electric, water and gas utilities as well as independent power producers and renewable energy companies. Mr. Colella has been in the investment banking industry for over 20 years and has advised some of the largest global power and utility clients on critical strategic and capital raising transactions. He also advises on M&A, capital markets, restructuring and bankruptcy transactions. Previously, Mr. Colella was a Managing Director at JP Morgan covering power and utility clients. Prior to joining JP Morgan in 2007, Mr. Colella was a member of the Global Utilities Group at UBS Investment Bank.

- Mr. Colella holds a B.A. from Rutgers College and an M.B.A. from the Johnson Graduate School of Management at Cornell University, where he was a Park Leadership Fellow.

- 20 years of investment banking experience in Power, Utilities and Renewables

- Formerly Managing Director at JP Morgan covering Power & Utilities

- Previously was a member of the Global Utilities Group at UBS

Nathan Barnes

Executive Director,
Power, Utilities, & Infrastructure

- Nathan Barnes is an Executive Director at Moelis & Company where he focuses on the power and utility sector. Mr. Barnes has been in the investment banking industry since 2009 and has advised power & utility clients on some of their largest and most strategic M&A and capital raising transactions. Mr. Barnes has significant expertise with electric, gas, and water utilities; gas pipeline and storage companies; independent power producers; renewable energy companies; and a broad range of energy marketing and energy services companies. Previously, Mr. Barnes was a Director at CenterPoint Energy in the Company's Strategic Planning Group where he had responsibility for driving M&A and organic growth initiatives. Prior to CenterPoint, Mr. Barnes was a member of J.P. Morgan's Power & Utility Investment Banking team for seven years.

- Mr. Barnes holds a B.S. in Economics from Auburn University, as well as an M.B.A. from the Darden Graduate School of Business and a J.D. from the School of Law at the University of Virginia.

- Over 10 years of investment banking experience in Power, Utilities and Renewables

- Former Director of M&A at CenterPoint Energy

- Previously a senior member of the Power & Utilities group at JP Morgan

Ren Orans

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ENERGY AND ENVIRONMENTAL ECONOMICS, INC. San Francisco, CA
Managing Partner

Dr. Orans founded Energy and Environmental Economics, Inc. (E3) in 1989. An economist and engineer, he has focused throughout his career on the challenges facing the electricity industry. He is a trusted advisor to a broad range of clients that have included government agencies, utilities, system operators, regulators, independent power producers, energy technology companies, public interest organizations, and investors. He has led E3 teams on numerous high-impact and high-profile projects that have required both rigorous technical analysis and the ability to effectively distill actionable insights to help E3's clients make informed decisions as they develop innovative projects, programs, or policies.

Dr. Orans' pioneering work in utility planning has centered on the design and use of area and time-specific (ATS) marginal costs for both pricing and evaluation of grid infrastructure alternatives. This seminal work has led to detailed area costing applications in pricing, marketing, and planning for many utilities throughout North America. He is an expert in designing wholesale transmission tariffs and has served as an expert witness in regulatory proceedings on retail rate design and wholesale transmission pricing, including for Canada's three largest utilities: BC Hydro, TransEnergie, and Ontario Power Generation.

In a recent forward-looking study, Dr. Orans provided his expertise to California's energy and environmental regulators in evaluating the operational challenges, feasibility, and cost consequences of a higher Renewables Portfolio Standard (RPS) in California by 2030.[1] This assessment included technical input from the California Independent System Operator (CAISO) as well as independent reviews from a distinguished four-member advisory panel and utilized E3's best-in-class Renewable Energy Flexibility (REFLEX) model. Additionally, in consultation with advisors to California's Governor and principals and staff from the energy agencies and the CAISO, Dr. Orans and E3 staff developed a set of technology deployment scenarios that meet California's goal of reducing greenhouse gas (GHG) emissions to 80 percent below 1990 levels by 2050.[2] This analysis leveraged E3's California PATHWAYS model, an economy-wide, infrastructure-based GHG and cost analysis tool that captures interactions among the buildings, industry, transportation, and electricity sectors in a low-carbon future.

Dr. Orans has also guided E3's national deep decarbonization analysis, most notably in the influential report *Pathways to Deep Decarbonization in the United States*.[3] Co-authored with Lawrence Berkeley National Laboratory (LBNL) and Pacific Northwest National Laboratory (PNNL), its principal finding is that multiple pathways exist to achieving deep decarbonization by midcentury at manageable cost. The report was published for the Deep Decarbonization Pathways Project (DDPP), an initiative led by the United Nations Sustainable Development Solutions Network (SDSN) and the Institute for Sustainable

[1] https://www.ethree.com/projects/modeling-californias-50-percent-renewables-portfolio-standard/
[2] https://ethree.com/public_projects/energy_principals_study.php
[3] http://unsdsn.org/wp-content/uploads/2014/09/US_DDPP_Report_Final.pdf

Development and International Relations (IDDRI) to explore how countries can transform their energy systems by 2050 to achieve needed greenhouse gas reductions.

Dr. Orans is a respected thought leader who is often asked to share his expertise and vision for the energy industry. He regularly publishes in refereed journals and has taught a graduate course on electric utility planning at Stanford University. He received his Ph.D. in Civil Engineering from Stanford University and his B.A. in Economics from the University of California at Berkeley.

DEPARTMENT OF ENERGY Washington, DC
NATIONAL RENEWABLE ENERGY LABORATORY 1992 – 1993
ELECTRIC POWER RESEARCH INSTITUTE
Lead Consultant

Dr. Orans developed new models to evaluate small-scale generation and DSM placed optimally in utility transmission and distribution systems.

PACIFIC GAS & ELECTRIC COMPANY San Francisco, CA
Research and Development Department 1989 – 1991

Dr. Orans developed an economic evaluation method for distributed generation alternatives. The new approach shows that targeted, circuit-specific, localized generation packages or targeted DSM can in some cases be less costly than larger generation alternatives. He also developed the evaluation methodology that led to PG&E's installation of a 500kW photovoltaic (PV) facility at their Kerman substation. This is the only PV plant ever designed to defer the need for distribution capacity.

ELECTRIC POWER RESEARCH INSTITUTE Palo Alto, CA
Consultant 1988 – 1992

Dr. Orans developed the first formal economic model capable of integrating DSM into a transmission and distribution plan; the case study plan was used by PG&E for a $16 million pilot project that was featured on national television.

DEPARTMENT OF ENERGY Washington, DC
Lead Consultant 1989 – 1990

Dr. Orans was the lead consultant on a cooperative research and development project with the People's Republic of China. The final product was a book on lessons learned from electric utility costing and planning in the United States.

PACIFIC GAS & ELECTRIC COMPANY San Francisco, CA
Corporate Planning Department 1989 – 1992

Dr. Orans was the lead consultant on a joint EPRI and PG&E research project to develop geographic differences in PG&E's cost-of-service for use in the evaluation of capital projects. Developed shared savings DSM incentive mechanisms for utilities in California.

PACIFIC GAS & ELECTRIC COMPANY San Francisco, CA
Rate Department Economist 1981 – 1985

As an economist at PG&E, Dr. Orans was responsible for the technical quality of testimony for all electric rate design filings. He was also responsible for research on customers' behavioral response to conservation and load management programs. The research led to the design and implementation of the first and largest residential time-of-use program in California and a variety of innovative pricing and DSM programs.

Education

Stanford University Palo Alto, CA
Ph.D., Civil Engineering

Stanford University Palo Alto, CA
M.S., Civil Engineering

University of California Berkeley, CA
B.A., Economics

Citizenship

United States

Refereed Papers

1. *Orans, R., F. Kahrl, and D. Aas (2017) "Envisioning the Electric Utility in 2030: 'Fat' or 'Skinny'?" Public Utility Fortnightly, March 2017.*

2. *Li, M., R. Orans, J. Kahn-Lang and C.K. Woo (2014) "Are Residential Customers Price-responsive to an Inclining Block Rate? Evidence from British Columbia, Canada," The Electricity Journal, 27(1), 85-92.*

3. *Orans, R., A. Olson, J. Moore, J. Hargreaves, R. Jones, G. Kwok, F. Kahrl and C.K. Woo (2013) "Energy Imbalance Market Benefits in the West: A Case Study of PacifiCorp and CAISO," The Electricity Journal, 26(5), 26-36.*

4. *Woo, C.K., I. Horowitz, B. Horii, R. Orans, and J. Zarnikau (2012) "Blowing in the wind: Vanishing payoffs of a tolling agreement for natural-gas-fired generation of electricity in Texas," The Energy Journal, 33:1, 207-229.*

5. *Mahone, A., B. Haley, R. Orans, J. Williams (2011) "Electric Vehicles and Gas-Fired Power: A Strategic Approach to Mitigating Rate Increases and Greenhouse Price Risk," Public Utilities Fortnightly (Dec 2011) 42-50, available at: http://www.fortnightly.com/exclusive.cfm?o_id=918*

6. *Alagappan, L., R. Orans, and C.K. Woo (2011) "What Drives Renewable Energy Development?" Energy Policy, 39: 5099-5104.*

7. *R. Orans, F. Pearl, A. Mahone (2010) "A Modest Proposal: After Cap and Trade," Brookings Institute.*

8. *Orans, R., C.K. Woo, B. Horii, M. Chait and A. DeBenedictis (2010) "Electricity Pricing for Conservation and Load Shifting," Electricity Journal, 23:3, 7-14.*

9. *Olson A., R. Orans, D. Allen, J. Moore, and C.K. Woo (2009) "Renewable Portfolio Standards, Greenhouse Gas Reduction, and Long-line Transmission Investments in the WECC," Electricity Journal, 22:9, 38-46*

10. *Orans, R., M. King, C.K. Woo and W. Morrow (2009) "Inclining for the Climate: GHG Reduction via Residential Electricity Ratemaking," Public Utilities Fortnightly, 147:5, 40-45.*

11. *Woo, C.K., E. Kollman, R. Orans, S. Price and B. Horii (2008) "Now that California Has AMI, What Can the State Do with It?" Energy Policy, 36, 1366-74.*

12. *Orans, R., S. Price, J. Williams, C.K. Woo and J. Moore (2007) "A Northern California - British Columbia Partnership for Renewable Energy" Energy Policy, 35:8, 3979-3983.*

13. *Lusztig, C., P. Feldberg, R. Orans and A. Olson (2006) "A Survey of Transmission Tariffs in North America," Energy - The International Journal, 31, 1017-1039.*

14. *Woo, C.K., A. Olson and R. Orans (2004) "Benchmarking the Price Reasonableness of an Electricity Tolling Agreement," Electricity Journal, 17:5, 65-75.*

15. *Orans, R., Woo, C.K., Clayton, W. (2004) "Benchmarking the Price Reasonableness of a Long-Term Electricity Contract," Energy Law Journal, 25: 2, 357-383.*

16. *Orans, R., Olson, A., Opatrny, C. (2003) "Market Power Mitigation and Energy Limited Resources," Electricity Journal, 16:2, 20-31.*

17. *Woo, C.K., D. Lloyd-Zannetti, R. Orans, B. Horii and G. Heffner (1995) "Marginal Capacity Costs of Electricity Distribution and Demand for Distributed Generation," The Energy Journal, 16:2, 111-130.*

18. *Pupp, R., C.K. Woo, R. Orans, B. Horii, and G. Heffner (1995) "Load Research and Integrated Local T&D Planning," Energy - The International Journal, 20:2, 89-94.*

19. *Chow, R.F., Horii, B., Orans, R. et. al. (1995) "Local Integrated Resource Planning of a Large Load Supply System," Canadian Electrical Association.*

20. *Feinstein, C., Orans, R. (1995) "The Distributed Utility Concept," The Annual Energy Review.*

21. *Woo, C.K., R. Orans, B. Horii and P. Chow (1995) "Pareto-Superior Time-of-Use Rate Options for Industrial Firms," Economics Letters, 49, 267-272.*

22. *Woo, C.K., B. Hobbs, Orans, R. Pupp and B. Horii (1994) "Emission Costs, Customer Bypass and Efficient Pricing of Electricity," Energy Journal, 15:3, 43-54.*

23. *Orans, R., C.K. Woo, R. Pupp and I. Horowitz (1994) "Demand Side Management and Electric Power Exchange," Resource and Energy Economics, 16, 243-254.*

24. *Woo, C.K., R. Orans, B. Horii, R. Pupp and G. Heffner (1994) "Area- and Time-Specific Marginal Capacity Costs of Electricity Distribution," Energy - The International Journal, 19:12, 1213-1218.*

25. *Orans, R., C.K. Woo and B. Horii (1994) "Targeting Demand Side Management for Electricity Transmission and Distribution Benefits," Managerial and Decision Economics, 15, 169-175.*

26. *Orans, R., C.K. Woo and R.L. Pupp (1994) "Demand Side Management and Electric Power Exchange," Energy - The International Journal, 19:1, 63-66.*

27. *Orans, R., Seeto, D., and Fairchild, W., (1985) "The Evolution of TOU Rates," Pergamon Press.*

Research Reports

1. *R. Orans, Woo, C.K., L. Alagappan, M. Madrigal, Creating Renewable Energy-Ready Transmission Networks, World Bank, September 2010*

2. *CPUC Staff, Olson, A., Orans. R., 33% Renewables Portfolio Standard Implementation Analysis Preliminary Results, California, June 2009.*

3. *Orans, R., Olson, A., Load-Resource Balance in the Western Interconnection: Towards 2020, Western Electricity Industry Leaders Group, September 2008.*

4. *Orans, R., Olson, A., Integrated Resource Plan for Lower Valley Energy, December 2004.*

5. *Orans, R., Woo C.K., and Olson, A., Stepped Rates Report, prepared for BC Hydro and filed with the BCUC, May 2003.*

6. *Woo, C.K. and R. Orans (1996) Transmission: Spot Price, Reliability Differentiation and Investment, report submitted to Ontario Hydro.*

7. *Orans, R., Woo, C.K., and B. Horii (1995) Impact of Market Structure and Pricing Options on Customers' Bills, Report submitted to B.C. Hydro.*

8. *Horii, B., Orans, R., Woo, C.K. (1994) Marginal Cost Disaggregation Study, Report submitted to PSI Energy.*

9. *Woo, C.K., L. Woo and R. Orans (1995) Rationing and Area-Specific Generation Costs, Report submitted to Pacific Gas and Electric Company.*

10. *Orans, R., Woo, C.K., and C. Greenwell (1994) Designing Profitable Rate Options Using Area- and Time-Specific Costs, Report No. TR-104375, Electric Power Research Institute.*

11. *Singer, J., Orans, R., Energy Efficiency Lending, A Business Opportunity for Fannie Mae, Report submitted to Fannie Mae.*

12. *Orans, R., Feinstein, C., et. al. (1993) Distributed Utility Valuation Study, submitted to the Electric Power Research Institute, the National Renewable Energy Laboratory, and PG&E.*

13. *Orans, R., Pupp, R. (1993) Menomonee Falls Case Study, Submitted to Wisconsin Electric Power Corporation.*

14. *Orans, R. and C.K. Woo (1992) Marginal Cost Disaggregation Study, Report submitted to Wisconsin Electric Power Corporation.*

15. *Orans, R., C.K. Woo, J.N. Swisher, B. Wiersma and B. Horii (1992) Targeting DSM for Transmission and Distribution Benefits: A Case Study of PG&E's Delta District, Report No. TR-100487, Electric Power Research Institute.*

16. *Orans, R., Swisher, J., Duane, T. (1989) Lessons Learned from U.S. Electric Utilities, Prepared for the Department of Energy for the People's Republic of China.*

17. *Orans, R. (1989) Area-Specific Marginal Costing for Electric Utilities: A Case Study of Transmission and Distribution Costs, Ph.D. Thesis, Stanford University.*

18. *Orans, R. (1987) The Risk of Sales Forecasts: Controllable through Indexation and Careful Disaggregation, Submitted to Stanford University and Pacific Gas and Electric Company.*

19. *C.K. Woo and R. Orans (1983) Transferability of Other Utilities' Time of Use Experiments to PG&E's Service Schedule D-7, Pacific Gas and Electric Company Reports filed with the California Public Utilities Commission.*

Conference Papers

1. *Orans, R. (2011) "Getting to 2050, Pathways to Deep Reductions in GHG Emissions," CFA Society Presentation, San Francisco, CA, October 25, 2011.*

2. *Orans, R. (2010) "Renewable Resource Opportunities in the West," Law Seminars International, British Columbia, August 2010.*

3. *Orans, R. (2009) "California's 33% RPS Implementation Plan," Law Seminars International, San Francisco, September 2009.*

4. *Orans, R. (2009) "Comparable Treatment of Resource Options," FERC Technical Conference, Phoenix, AZ, September 2009.*

5. *Orans, R. (2008) "A GHG Compliant World in 2050," Law Seminars International, San Francisco, CA, September 2008.*

6. *Orans, R. (2007) "Gaps in State Energy Policy Coordination: A View from the Cheap Seats," CFEE, Napa, California, September 2007.*

7. *Orans, R. (2004) "Evaluating Generating Resources based on an Equivalent Reliability Methodology," 2nd Annual Resource Planning Symposium, January 2004, Vancouver, Canada.*

8. *Martin, J., Orans, R., Knapp, K. (2000) "DG Economics and Distribution Rate Design," Western Electric Power Institute, Distributed Generation and the Utility Distribution System Conference, Reno, NV, March 22-23, 2000.*

9. *Orans, R. (1997) "Getting the Transmission Prices Right," Facilitating Cross Border Trade, New Mexico.*

10. *Orans, R. (1997) "Deregulation on the Mainland: What is Happening and What is Not," PCEA Conference, Hawaii.*

11. *Swisher, J., Orans, R. (1995) "A New Utility DSM Strategy Using Intensive Campaigns Based on Area Specific Costs," ECEEE 1995 Summer Study.*

12. *Orans, R., Greenwell, C. (1995) "Designing Profitable Rate Options Using Area and Time-Specific Costs," Prepared for EPRI, Annual DSM Review, Dallas, Texas.*

13. *Orans, R. (1995) "Integrated Local Area Planning," Prepared for NELPA and presented in Calgary.*

14. *Orans, R. "Local Area Planning for Profit: Annual Review of Distributed Resource Studies," Prepared for EPRI, Lake George, New York.*

15. *Orans, R., C.K. Woo, B. Horii and R. Pupp (1994) "Estimation and Applications of Area- and Time-Specific Marginal Capacity Costs," Proceedings: 1994 Innovative Electricity Pricing, (February 9-11, Tampa, Florida) Electric Research Power Institute, Report TR-103629, 306-315.*

16. *Heffner, G., R. Orans, C.K. Woo, B. Horii and R. Pupp (1993) "Estimating Area Load and DSM Impact by Customer Class and End-Use," Western Load Research Association Conference, September 22-24, San Diego, California; and Electric Power Research Institute CEED Conference, October 27-29, St. Louis, Missouri.*

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Mr. Miller joined E3's Asset Valuation team in 2019. An experienced economics and finance professional, he is skilled in financial modeling and a range of quantitative analyses, including cash flow forecasting, financial valuation, Value for Money (VfM), Economic Cost-Benefit Analysis (CBA), fiscal commitment and contingent liability evaluation, risk assessment, tariff structuring, and sensitivity analysis. Prior to joining E3, Mr. Miller spent more than four years at K&M Advisors, an international finance and engineering advisory firm, where he performed financial modeling and analysis of power projects totaling 3,250 MW in 16 countries and covering a range of generation technologies. He has advised a wide range of clients from government agencies and multilateral development institutions to utilities, project sponsors, and private equity investors. Mr. Miller holds a B.A. with honors in International Relations and Economics from Pomona College and a M.A. with honors in Energy and International Finance from the John Hopkins University School of Advanced International Studies (SAIS).

K&M ADVISORS Chevy Chase, MD
Manager September 2014 – June 2019

- Led due diligence, financial modeling, contract negotiation support, and/or market analysis for over 20 power projects in more than 16 countries (> 3,250 MW of solar PV, wind, hydro, geothermal, natural gas, liquids)
- Project manager for 140 MW geothermal IPP in Kenya; led feasibility study (technology options, cost-benefit analysis, demand, tariff, commercial structure, and environmental/social impact). Advising on procurement
- Led financial due diligence for a private equity fund on LNG and merchant solar projects in Chile (> $1 billion); reviewed sponsor's financial models and spot market pricing; performed risk analysis of DSCRs and cash flows
- Led development of a DCF valuation model and due diligence for > $100 million binding offer from private investors to acquire four power plants (244 MW) in Central America & the Caribbean
- Modeled dispatch and system generation costs for a 100 MW capacity addition in Aruba under various solar and wind scenarios, resulting in $100 million investment decision. Currently advising on LNG procurement strategy
- Led tariff structuring and financial modeling for 40 MW solar PV project in Kenya; presented to utility senior management team; project was approved for capital raising and implementation
- Modeled load profile, generation mix, and unit costs of power supply options (solar, wind, gas, storage, and grid interconnections) for major port operator in Colombia; assessed regulations and risks to identify preferred option

CASTALIA STRATEGIC ADVISORS Washington, DC
Economic & Financial Analyst July 2013 – August 2014

- Advised electricity regulator in the Philippines on the design of new performance incentives and revisions to the rate base valuation methodology for distribution utilities
- Led analysis of carbon financing mechanisms for renewable energy in SE Asia for the World Bank

INTERNATIONAL COUNCIL ON CLEAN TRANSPORTATION (ICCT) Washington, DC
Fuels Intern Summer 2012

- Conducted original research on commercialization policies for advanced biofuels; co-authored ICCT white paper, *Measuring and Addressing Investment Risk in the Second-Generation Biofuels Industry*

Education

The Johns Hopkins University, Washington, DC
School of Advanced International Studies (SAIS)
M.A., Energy & Finance (with Honors) 2013

Pomona College Claremont, CA
B.A., International Relations & Economics (Cum Laude) 2008

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