

Witness Statement

Ronald L. Knecht

1. POSITION

- 1.1 I currently serve as the Nevada State Controller. The State Controller is the chief fiscal officer of State of Nevada, United States and is an elected public position. My term in office commenced on 5 January 2015.

2. QUESTION

- 2.1 I have been asked to provide my view, based on my experience and training, of the use of the Fama French Three Factor Model (**FF3F**) in the regulation of energy utilities.
- 2.2 I confirm that this statement reflects my views.

3. PROFESSIONAL BACKGROUND

- 3.1 I hold the following qualifications:
- 3.1.1. Bachelor of Arts (BA) (1971) from the University of Illinois at Urbana-Champaign;
 - 3.1.2. Master of Science (MS) (1989) from Stanford University; and
 - 3.1.3. Doctor of Law (JD) (1995) from the University of San Francisco.
- 3.2 I have worked as an economist and policy analyst in both the private and public sectors:
- 3.2.1. I was employed as a Commissioner's Senior Advisor and then Principal Energy Program Specialist at California Energy Commission in 1978-79. As part of this role I gave expert testimony on behalf of the Commission.
 - 3.2.2. I was employed by the California Public Utilities Commission between 1979 - 86. I held a position as a principal analyst in economics in the finance, policy and technical areas. I was also a section supervisor and served on all Public Staff Management Committees at that agency. As part of this position I gave expert testimony on behalf of the agency.
 - 3.2.3. I was employed as a Senior Economist at Dames & Moore Engineers & Consultants in 1986. As part of this position I gave expert testimony for clients.
 - 3.2.4. I was employed by QED Research between 1986-1988. I served as Principal. As part of this position I gave expert testimony.
 - 3.2.5. I was employed by Spectrum Economics, Inc between 1988-1990. I served as Vice-President. As part of this position I gave expert testimony.

- 3.2.6. I was employed by Economic & Technical Analysis Group between 1990-2001. I served as President and I also gave expert testimony as part of this role.
- 3.2.7. I was employed by the Nevada Public Utilities Commission (**PUCN**) between 2001-2012. I ended my tenure there as Senior Economist. In my position with the PUCN I appeared as an expert witness in economic, financial, technical and policy matters on behalf of the PUCN. In all I have given testimony in legal and regulatory hearings over 150 times in over 20 jurisdictions.
- 3.2.8. I was employed by SNL Financial on a part-time basis between 2009-2013. In that role I co-taught two-day seminars on utility finance, cost of capital, economic and policy issues for regulators, professionals, managers, securities analysts and others from the US and Canada.
- 3.3 I sat on the Board of Regents of the Nevada System of Higher Education between 2006-2014. I was first elected to the Board in November 2006 and took office 1 January 2007. I was re-elected in 2012 to serve another six-year term and served until 5 January 2015 (when I resigned to begin my term as Controller). During that period:
 - 3.3.1. I served seven years as a very active member of the Investments and Major Facilities Committee, which now oversees \$1-billion in endowment and operating fund investments.
 - 3.3.2. I was elected as the representative for school District 9.
 - 3.3.3. For two years I chaired the Business & Finance Committee and for one year I was Vice-Chairman. This Committee was the budget Committee for the State of Nevada System of Higher Education.
 - 3.3.4. I chaired the Board's Audit Committee in 2007-08 and 2013-14.
 - 3.3.5. I also served on the Research & Economic Development, Health Sciences System, Board Development, and Cultural Diversity & Security committees and served on various presidential selection and performance review committees, chairing two of them.
- 3.4 Please see my Resume (**Annexure A**) for more information about my personal and professional background.

4. FAMA-FRENCH THREE FACTOR MODEL

- 4.1 The FF3F is one of a number of approaches that can be used to calculate the cost of equity. Unlike the basic Capital Asset Pricing Model (**CAPM**), which was derived from financial theory, the FF3F was devised using empirical data. Other such models include the Sharpe-Lintner CAPM (**SL-CAPM**), the Empirical CAPM (**ECAPM**) and the Dividend Discount Model.
- 4.2 The FF3F Model is an extension of the basic CAPM that includes the factors of:

- 4.2.1. the value factor, being the difference between the return to a portfolio of high book-to-market stocks and the return to a portfolio of low book-to-market stocks. This factor incorporates the premium for “value” stocks versus “growth” stocks;
 - 4.2.2. the size factor, being the difference between the return to a portfolio of small-cap stocks and the return to a portfolio of large-cap stocks. This factor incorporates the premium for small stocks versus large stocks; and
 - 4.2.3. the market factor, being the difference between the returns on the market portfolio and the riskless rate. This factor takes the same form as appears in the CAPM; however, the FF3F and CAPM beta values (i.e., the sensitivity of the stock to this market factor) need not be the same.
- 4.3 The FF3F model is a sophisticated and reasonable model to use to estimate the cost of equity capital where data are available to calibrate it. It has good empirical and theoretical reasoning.
- 4.4 Prior to the GFC in 2007-2009 the FF3F model tended to yield high-end estimates relative to the two DCF, CA+I/RP and various other CAPM models. Since then, it has tended to yield low-end estimates. While some parties may have changed their views towards it in light of those results I have continued to use it based on theoretical and empirical estimates. Long-term market trends will tend to drive the estimates of one model higher than another for some years and then lower for another stretch of time. This fact justifies both the use of a wide range of models and also the continuation of the same set of models through these variations.
- 4.5 Using a number of different models is superior to relying on a more limited selection of models. This is because the CAPM, ECAPM, FF3F, and CA+I estimates use basic cost of capital data in a different manner to the DCF models. The CAPM, ECAPM, FF3F and CA+I models extract information from the Cost of Capital data that the DCF models miss – and vice versa. Using multiple models provides additional perspectives and information, yielding a more accurate, reliable, and robust estimate.
- 4.6 While there is still some apprehension about the use of the FF3F Model it has been recognised in at least three states, Massachusetts, Delaware and Nevada, when used in conjunction with other models to produce an arithmetic mean as an estimate. This approach ensures that factors that are ignored by one model are adequately addressed. Because the FF3F model is fairly new relative to other models I am not aware of any jurisdiction that has endorsed it exclusively or adopted allowed rates of return based expressly on it. Instead, the American tradition is for regulatory decisions to review (or even just list) all the evidence in the record and then, subjectively balancing the merits and results of all of it, to arrive at a final conclusion as either a range of reasonableness or a point estimate.

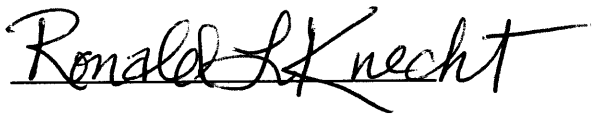
5. MY PROFESSIONAL EXPERIENCE WITH THE FAMA-FRENCH THREE FACTOR MODEL IN REGULATORY HEARINGS AND OTHER CONTEXTS

- 5.1 I have appeared as an expert witness before many Public Utilities Commission hearings in California, Nevada, and elsewhere. In a number of these hearings I have adduced evidence of FF3F modeling. After reliable data for using the FF3F model

became available, I relied on it in addition to four or five other models. In some cases, the Public Utilities relied expressly on my estimates, and in others they relied on those plus the testimony of other parties. For example:

- 5.1.1. In April 2006 in Application of Sierra Pacific Power Company for authority to increase its annual revenue requirement for general rates charged to all classes of electric customers and for relief properly related thereto; Application of Sierra Pacific Power Company for approval of new and revised depreciation rates for electric operations based on its 2005 depreciation study 2006 Nev. PUC LEXIS 91, I proposed a rate of return of 10.28 per cent, which was calculated as an arithmetic mean of two discounted cash flow (DCF) estimates, a 2CAPM/FF3F Model average and one risk premium estimate. This was a better approach than relying only on the average of the DCF models because the additional methods used basic cost of capital input data differently from the DCF models. The estimate for the 2CAPM/FF3F was 10.13 per cent, comprising a result from the CAPM using an Ibbotson beta (with size adjustment) of 8.25 per cent, and a result from the Fama-French Three Factor model of 11.63 per cent. My evidence was accepted by the Nevada Public Utilities Commission without reservation.
- 5.1.2. In July 2007 in Application of NEVADA POWER COMPANY for authority to increase its annual revenue requirement for general rates charged to all classes of electric customers and for relief properly related thereto 2007 WL 2171450, I used the FF3F Model to assess the rate of return on equity. To calculate the FF3F return for each of the 77 energy utilities in our database I used betas and risk premiums from our most recent Beta Book which was then published by Ibbotson Associates (which was later acquired by Morningstar), based on data up to the end of 2006. I obtained a result for an average energy utility of 11.39 per cent. The average of two CAPM methods and the FF3F model was 11.13 per cent. My evidence was accepted by the Nevada Public Utilities Commission without reservation.
- 5.1.3. In the 2012 Cost of Capital dockets before the California Public Utilities Commission I testified for an intervenor party. My testimony included use of the FF3F model in conjunction with five other methods. While the Public Utilities Commission neither explicitly endorsed or rejected the FF3F model, in recognition of the value of the testimony, made a costs order in favour of the intervenor. The California Public Utilities Commission did cite approvingly the quantitative detail, breadth of methods and evidence on which I relied.
- 5.2 I have presented on Cost of Capital analysis and the FF3F model on a number of occasions. On 17 April 2009 for example, I made a speech at the 41st Financial Forum of the Society of Utility and Regulatory Financial Analysts (SURFA) in Washington, D.C. I observed that:
 - 5.2.1. 'Company-specific results show that the ROEs estimated by the [FF3F and CAPM] tend to move together over time, although they may remain far apart, converge or even cross. In a few cases, the FF3F results can be more stable over time than are the CAPM estimates.'

- 5.2.2. 'It is not possible to say whether the numbers provided by the Fama French model are better or more reliable than the cost of equity estimates provided by the CAPM. Both models fail to produce logical results for a large number of entities. As each model is tested by the events of the previous year the Fama-French model should be viewed as an additional tool available to analysis in determining the cost of equity and should not be discarded.'
- 5.3 Between 2009 and 2013 I co-taught a two day seminar with Professor Roger Morin for SNL Financial on utility finance, cost of capital, economic and policy issues for regulators, professionals, managers, securities analysts and others from the United States and Canada. We presented the FF3F model and endorsed it as a standard and useful tool for estimating the cost of common equity when used with a suite of other models.
- 5.4 If I testify again I expect to use the same six models I have employed previously: two 3-stage DCF estimates, the CA+I/RP model, the FF3F model, the standard CAPM model and the Morin ECAPM. I generally give these results equal weight.
- 5.5 In my opinion the FF3F model is valuable and should receive consideration along with other models.



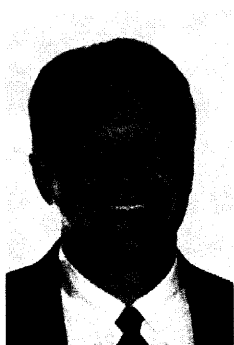
Ronald L. Knecht

DATED: 19 JUNE 2015

Signed in Carson City, Nevada, United States of America

Annexure A

Ron Knecht, MS, JD & PE Nevada State Controller



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Ron Knecht is an economist, financial and policy analyst, CA Registered Professional Mechanical Engineer, and law-school graduate who became Nevada Controller January 5, 2015. He serves on Nevada's Board of Finance, Department of Transportation Board of Directors, and Executive Branch Audit Committee. He has split his 44 working years between public service / higher education and entrepreneurial small business, all in managerial and senior professional positions. He's been a founder, executive or director for 12 firms, charities and public interest groups.

In previous jobs, he wrote, spoke and testified extensively as an expert witness in his subject-matter areas. In 2012-14, 1986-2001 and 1976-78, he worked full-time as a consultant and executive. In 2001-12, he was a senior economist at Nevada's Public Utilities Commission. He held similar positions in 1978-86 at California's Energy and Public Utilities Commissions. In 2009-13 he co-taught two-day seminars for SNL Financial on utility finance, cost of capital, economic and policy issues for regulators, professionals, managers, securities analysts and others from the US and Canada. In 1973-77, he was a Research Associate and Research Engineer at the University of Illinois; as a graduate and undergraduate student there, he held research and administrative jobs. In 1972-73 he was Assistant City Engineer in Urbana IL.

Ron was elected to the Board of Regents of the Nevada System of Higher Education in 2006 representing the extended Sierra Front area and re-elected in 2012. For two years, he chaired the Business & Finance (budget) Committee and was Vice-chair another year; he chaired the Audit Committee two years; and for seven years he was very active on the Investment and Major Projects Committee, which oversees \$1-billion of endowment and operating funds. He also served on the Research & Economic Development, Health Sciences System, Board Development, and Cultural Diversity & Security Committees and on institutional presidential selection and performance-review committees, chairing two of them. Ron was elected to the Nevada Assembly for 2002-04, representing District 40 (Carson and Washoe Cities), serving on the Assembly Commerce & Labor, Government Affairs and Transportation committees.

The most important things in Ron's life are his wife, Kathy, their thirteen-year-old daughter, Karyn, and Ron and Kathy's mothers and families. Born and raised in a small town (Belleville IL) in the Midwest, he has rendered life-long public, community, charitable and professional service. With some scholarship support, he worked his way through undergraduate and early graduate studies at a public university (Illinois). Spending most of his working career in San Francisco and Silicon Valley, he paid his way at private graduate and law schools (Stanford and San Francisco) while working full time. He's been a Nevadan By Choice since 2001, a columnist for various print and on-line papers, and he has taught part-time at two colleges.

All his life, Ron has been active in a wide range of athletics and outdoor activities, but his skills being very modest, he had to get his high school letters and college numerals as a distance runner. As an observer, he enjoys ballet and modern dance, symphony, opera, theater and film, and he collects baseball cards and pursues other hobbies.

Professional, Managerial and Business Experience and Elected Office

- Nevada State Controller and, as Controller, a member of Nevada's Board of Finance; Board of Directors of Nevada Department of Transportation; and Executive Branch Audit Committee – elected in 2014 to 2015-19 term
- Consultant in economic, financial, technical and policy analysis, (CC, NV) 2012-14
- Economist / Senior Economist, Resource and Market Analysis Division, Public Utilities Commission of Nevada, 2001-12
- Regent, District 9, Nevada System of Higher Education, elected to two terms and served 2007-15; twice Chairman, Business & Finance and Audit Committees; served on Investment & Major Projects, Health Sciences System, Research & Economic Development, Health Sciences System and Cultural Diversity & Security committees and various Presidential Search and Performance Review committees, chairing two
- Assemblyman, District 40, Nevada Assembly (Carson and Washoe Cities), 2002-04; Commerce and Labor, Government Affairs, and Transportation Committees
- President, Economic & Technical Analysis Group (SF and Los Altos CA), 1990–2001
- Board of Directors, Minimax Research Corporation (Campbell CA), 1988-94
- Vice-President, Spectrum Economics, Inc. (Palo Alto & Mountain View CA), 1988-90
- Principal, QED Research, Inc. (Palo Alto CA), 1986-88
- Senior Economist, Dames & Moore, Engineers & Consultants (San Fran. CA), 1986
- Section Supervisor, principal analyst (economics, finance, technical analysis and policy) and member of all division management committees, California Public Utilities Commission (San Francisco CA), 1979-86
- Cofounder, Chairman, CEO & CFO, The Rainbow Connection, Inc. Restaurant (Springfield IL), 1979-83
- Commissioner's Senior Advisor and then principal analyst (economics, technical analysis and policy), California Energy Commission (Sacramento CA), 1978-79
- Partner, Bertschi & Knecht Engineers & Consultants (IL and CA), 1976-86
- Energy Research Engineer (1974-77); Center for Advanced Study Research Associate (1973-74); Research Assistant (Economics, 1970-71; Social Work, 1971-72); Grader/Consultant (Computer Science, 1969-71); *Daily Illini* Reporter (1971-72) and Columnist (1973-75); Assistant to Dean of Student Services (1970-71); Student Senate Office Manager (1968-69); hourly student non-professional employment, 1967-71 – all at University of Illinois, Urbana-Champaign
- Assistant City Engineer, City of Urbana IL, 1972-73

Education, Teaching and Professional Registration

- University of San Francisco Law School, 1995: Juris Doctor
- Stanford University, 1989: M.S., Engineering-Economic Systems
- University of Illinois at Urbana-Champaign, 1971: B.A., Liberal Arts & Sciences (major in Mathematics; minor in Physics & Chemistry); completed additional course work in economics and engineering, plus Civil Engineering masters degree project (American Nuclear Society award winner) in Power Generating Economics, 1977
- Economics Instructor (Micro- and Macro-Economic Analysis), Western Nevada Community College, Carson City, NV, 2003-06
- Instructor, Regulatory & Legal Aspects of Telecommunications, for graduate students, Golden Gate University, Sacramento CA, 1991
- Registered Professional Mechanical Engineer, State of California, since 1986

Areas of Experience, Publication and Expert Testimony (~150 times; 25 jurisdictions)

- Regulation: Electric; Natural Gas; Nuclear Power; Coal; Communications; Water, Wastewater and Sewers; Insurance; Transportation; Environmental; Land Use; Finance and Securities; Discount Rates for Public Policy and Business
- Utilities: Ratemaking (all aspects); Finance; Strategic and Resource Planning and Forecasting; Operations and Modeling; Operating and Facilities Certificates
- Business Analysis and Management: Planning, Strategy, Finance, Valuations, Cost of Capital, Market Power, and Operations
- Regulatory and Industrial Change: Incentive-based Regulation; Industry De- and Re-regulation and Restructuring; Public versus Private Provision of Services
- Energy: Electricity, Natural Gas, Nuclear Power, Coal, Oil, Cogeneration, Conservation, Renewables, Distribution Companies, Transmission and Independent System Operators, Transportation and Industrial Use
- Economics and Policy: Micro- and Macro-economic Analysis; Taxation, Budgeting and Public Finance; Resources and Pollution; Transportation; Public Safety; Health Care; Human and Social Services; Education
- Law and Economics: Anti-trust; Due Diligence; Mergers and Acquisitions; Bankruptcy Workouts; Litigation Settlement; Alternative Dispute Resolution; Diversification
- Engineering Economics: Systems Analysis/Control; Optimization; Decision & Probabilistic Analysis
- Other: Mechanical and Civil Engineering; Statistics; Program and Project Management; Staff Supervision

Civic, Community, Charitable, Public and Professional Service

- Endorsed by Nevada Republican State Convention as State Controller candidate, 2014; also by Nevada Republican Assembly, Citizen Outreach, Carson City and Nye County Republican Parties, Log Cabin Republicans and National Rifle Association; elected
- Weekly columnist, *Nevada Appeal*, *Elko Daily Free Press*, *Lahontan Valley News* and other on-line and print papers), 2013-present
- Co-instructor for SNL seminar on utility, finance, cost of capital, economic & policy issues, 2009-13
- Seminar Presenter, Utility Valuations, SNL Finance, New York, 2012-13
- Board of Directors & Legislative Chairman, Carson City Court Appointed Special Advocates for Children (CASA), 2005-present; Chairman of Board, 2013-present
- Board of Directors, Carson City Kiwanis Club, 2002-04 and 2005-07; member of Club's Scholarship Board, 2004-07; Member, Kiwanis Club, 2001-present
- Co-sponsor, Carson High School Science Fair, 2004; active local education support of various kinds, 2002-present
- Carson City Republican Central Committee, 2001-2012; Chairman, 2005-07
- Member, Western Economics Association (WEA), 1998-present
- Member, Carson City Navy League Chapter, 2004-12
- Carson City Chairman, Governor Jim Gibbons Re-election Campaign, 2010
- Member and speaker at Society of Utility and Regulatory Financial Analysts (SURFA), 2007-2009
- Organizing Committee, Rutgers University Center for Research in Regulated Industries annual Western Conference, 2005-2007
- Instructor, "Managing Your Life and Family Finances", for clients of Friends in Service Helping (FISH) faith-based charity, Carson City NV, 2005 and 2007-08
- Carson City Methamphetamine Task Force Public Awareness Committee, 2005-06
- Carson City School District Social Studies Textbook Selection Committee, 2004-05

- Co-organizer, "Thank You" event honoring Carson City Waterfall Fire First Responders, 2004
- Republican Nominee, Assembly District 40 (Carson and Washoe Cities), 2002 & 04
- Chairman, Carson City (Water and Sewer) Utilities Advisory Committee, 2002-03
- Associate Member, Carson City Area Chamber of Commerce, 2002-06
- Nevada Republican Central Committee, 2002-07 and 2015
- Candidate (non-partisan), Los Altos CA City Council, 1999
- California Republican Central Committee, 1998-2001
- Director, Santa Clara County CA Lungren for Governor Operations, 1998
- Co-founder and Principal, Advocates for the Public Interest (San Francisco and Los Altos CA), 1998-2001
- Founder, University of San Francisco Federalist Society, 1994-95; Advisor, 1997-2001
- Senior Editor and Writer, University of San Francisco Law School *Forum*, 1994-95
- Founding Board Member, Illinois Public Action Council, 1976-77
- Co-founder and Executive Director, Illinois Power Project (Urbana IL), 1976-78
- Chairman, Electric Load Forecasting Statewide Committee of Energy Experts to Advise Illinois Legislature, 1975-76
- Board of Directors, Illinois Committee on Freeways (Urbana IL), 1975-76
- Member and Secretary, City Board of Zoning Appeals, Urbana IL, 1974-78
- Democrat Nominee, City of Urbana IL City Council, Ward 2, 1973
- Senator and Member, Steering Committee, University of Illinois Student Senate, 1968-69
- President, Independent Freshmen Men, University of Illinois, Urbana, 1967-68
- Ran Freshman Cross-Country and Track, University of Illinois, 1967-68
- Southern Illinois Master Councilor and other positions, Order of DeMolay, 1966-68
- Assistant Editor, *HyNews*, Belleville, IL Township High School (West), 1966-67
- Class President, National Science Foundation Summer Math & Computer Science Program, St. Louis University, 1966
- Ran Cross-Country & Track, Belleville Township High School (West), 1963-67; varsity letters, 1965-1967; All-St.Clair-County Cross-Country Team, 1966
- Master Councilor / other positions, Tancred Chapter, DeMolay, Belleville IL, 1964-68
- Senior Patrol Leader & other positions, Cub and Boy Scouts, Belleville IL, 1957-64

(12 February 2015)