

## Nomination of E. Grant Read for the ORSNZ Daellenbach Prize

Following rules for the Daellenbach Prize, <http://www.orsnz.org.nz/prizes/DaellenbachDetails.html>, we hereby nominate Grant Read for the 2012 Daellenbach Prize.

Respectfully submitted by Assoc. Prof. Don McNickle and Sr. Lecturer John F. Raffensperger, Dept of Management, University of Canterbury.

9 May 2012

### Nomination Statement

“This statement is expected to describe a body of innovative OR/MS work in New Zealand that demonstrates international recognition as evidenced by publication and shows clear evidence of impact in a practical setting.”

Grant has literally set standards with his many contributions to New Zealand’s energy markets and reservoir management.

### Attached publications

This selection omits commercial documents which Grant has written for governments and businesses. It also omits many papers in which Grant had a major (even a defining) contribution, but was not listed as first author. The list shows the length of his work, with important contributions in the 1980s.

Read, E.G. and Hindsberger, M. (2010) “Constructive Dual DP for Reservoir Optimization.” In P.M. Pardalos, S. Rebennack, M.V.F. Pereira and N.A. Iliadis (Ed.), *Handbook on Power Systems* 1. (3-32). Heidelberg: Springer. <http://dx.doi.org/10.1007/978-3-642-02493-1>.

Read, E.G. and D. Chattopadhyay. Electricity market models: Lessons from Australasian experience. Procs. ORSNZ 34th Annual Conference, Waikato, 1999: 33-42.

Read, E.G. George, J.A and MacGregor, A.D. Stochastic dual dynamic programming with lagged variables. Proceedings of the 30th Annual Conference of the O.R. Society of N.Z. August 1994 145-53.

Read, E.G. and George, J.A. Dual Dynamic Programming for Linear Production/Inventory Systems *Journal of Computers and Mathematics* 19, 11 1990 29-42.

Read, E.G. and Boshier, J.F. Biases in Stochastic Reservoir Scheduling Models in Esogbue, A.O. (ed.) *Dynamic Programming for Optimal Water Resources System Management* Prentice Hall NY 1989 386-398.

Read, E.G., Culy, J.G., Halliburton, T.S., and Winter, N.L., A simulation model for electricity planning in New Zealand. *Operational Research*, 1988.

### Grant’s CV

*Based on an old version of Grant’s CV, to which we have updated and commented on some material.*

Managing Director, EGR Consulting Ltd, PO Box 29-131, 14 Pentre Tce, Christchurch, New Zealand, and Adjunct Professor, University of Canterbury

### Academic qualifications

BSc (Hons), 1st Class in Mathematics, University of Canterbury, 1975

Ph.D in Operations Research, Department of Economics, University of Canterbury, 1979

### Present research/professional speciality:

- Efficient regulatory and market structures for the electricity sector
- Coordination of generators in competitive electricity markets
- Reservoir management methods
- Pricing in electrical networks
- Optimal operation of hydro/thermal generation systems
- Duality in Dynamic Programming
- Practice of OR

Years as a practising researcher: 25

## **Track Record**

Dr Read is a past president of the Operations Research Society of New Zealand, and is now an Adjunct Professor in Management Science at Canterbury University. He has maintained a successful joint academic/applied career, establishing the Energy Modelling Research Group at Canterbury University, a group funded by his clients in the New Zealand electricity industry to undertake pioneering research on various aspects of market design, and reservoir management in a market context. In this context he has supervised 10 doctoral students, many of whom have gone on to successful international careers.

He has undertaken consultancies in several sectors, including telecommunications and gas. For three decades, though, he has been most closely involved with the electricity sector, both as a researcher and a consultant on economic dispatch, reservoir management, expansion planning and pricing issues, having devised the models used for those purposes in New Zealand over many years, and undertaken consultancies on these topics in Australia and North America. Specifically, he was responsible for developing the “Dual Dynamic Programming” methodology employed by the RESOP/PRISM/SPECTRA family of hydro reservoir management models, first developed by the Ministry of Energy in 1984, later used by ECNZ and still used by several market participants and government bodies today. He has subsequently supervised several theses on the adaptation of such techniques to the more complex problems arising in a market context.

For the last 15 years, though, Dr Read has concentrated on restructuring and market issues, having been a key adviser to the Electricity Sector Task Force and the Wholesale Electricity Market Study in New Zealand, and undertaken a variety of international consultancies. In particular he has taken a lead role in the study of generator market power issues, and in theoretical development and practical implementation of mechanisms for energy/reserve market co-ordination, nodal spot pricing, energy contracting, inter-regional hedging, and transmission infrastructure cost recovery. Much of this work was incorporated into the groundbreaking design of the New Zealand electricity market. Particular innovations included the development of an integrated energy/reserve market formulation, now successfully copied in several overseas markets, and the first optimisation model for hydro reservoir management in a market environment.

Dr Read has subsequently played a key advisory role with respect to the development of the Australian National Electricity Market, chaired the committee responsible for the introduction of retail competition in New Zealand, and been heavily involved in the design of electricity market arrangements in Ontario, Singapore, the Philippines and, most recently, Ireland. This has involved continuing innovation, for example in the development of alternative constraint representations, and corresponding price structures, for the Australian electricity market.

## **Major achievements in commercial, social and environmental areas**

Dr. Read’s dual academic/applied career has been outlined in a previous section. Prior to 1985 he was responsible, among other things, for developing:

- The electricity chapter, and planning methodology, for the first New Zealand Energy Plan
- Three generations of reservoir management and power system simulation models employed by the New Zealand Ministry of Energy and successor organisations
- The analytical models used to assess oil stockpiling requirements and the economics of gas depletion policy for New Zealand

Since 1985 he has undertaken a wide range of relevant consultancies in the areas of reservoir management and market design, including:

- The electricity chapter, and planning methodology, for the first New Zealand Energy Plan
- Three generations of reservoir management and power system simulation models employed by the New Zealand Ministry of Energy and successor organisations
- Advice to Electricity Corporation of New Zealand (ECNZ) on hydro-thermal power system co-ordination, reservoir management, and planning models.
- Development of wholesale and transfer pricing frameworks for ECNZ.
- Development of an innovative transmission/reserve pricing framework for New Zealand.
- Advice to New Zealand government/industry task forces on electricity market reform and industry restructuring.
- Development of theory, and design and testing of a model, for a market based on nodal transmission pricing in an AC system.
- Design and testing of models for river chain scheduling, unit commitment, and short term hydro/thermal co-ordination for ECNZ.
- Design and testing of an energy sector modelling system for a major private sector client in New Zealand.
- Development of an integrated energy/reserve market framework for New Zealand electricity.
- Review of dispatch/pricing formulation, and audit of software for the New Zealand electricity market.
- Chairmanship of New Zealand electricity industry committee responsible for introduction of effective retail competition via “profiling”.
- Review of modelling requirements in the new market environment for a major New Zealand hydro generator.
- Review of conflicting financial transmission right proposals, and development of a framework for future electricity industry development for the New Zealand Ministry of Economic Development.
- Development of analytical framework to understand pricing impacts of security constraints in the New Zealand electricity market
- Review of operational modelling for a major New Zealand hydro development proposal
- Submissions on various aspects of market design, on behalf of a major New Zealand electricity generator.

He has done similar work internationally:

- Review of electricity sector restructuring for Statkraft in Norway.
- Review of models for valuation of a South American hydro power system.

- Study of generator gaming opportunities, and transmission capacity right options, for the Victorian state and Australian national markets.
- Design of reservoir management and bid optimisation models for two major Australian power companies.
- Review of market dispatch/pricing proposals for the National Grid Management Council, Australia.
- Review of an optimisation model for a Canadian hydro system.
- Review of ancillary services arrangements for the Australian electricity market.
- Development of an inter-regional trading framework for the Australian electricity market.
- Review of dispatch/pricing formulation, and audit of software for the Australian National Electricity Market.
- Review of market logic, and design and testing of modelling systems, for an innovative gas market for the Australian state of Victoria.
- Review of initial experience with electricity market software for Queensland, Australia.
- Review of electricity market design and market clearing formulation issues for Ontario, Canada.
- Review of rule and software changes to accommodate entry of “entrepreneurial interconnectors” in the Australian national electricity market.
- Design of proposed new electricity market arrangements for Malaysia.
- Review of design for reservoir management and dispatch/commitment optimisation models for two major Australian hydro generators.
- Review of electricity market arrangements for Singapore.
- Review of constraint pricing effects and locational pricing arrangements in the Australian national electricity market.
- Design and implementation of electricity market arrangements, including market rules and market clearing formulations, for Singapore.
- Development of analytical framework for contract and market offer management for a major Australian hydro generator.
- Design of electricity market arrangements, including market rules and market clearing formulations, for the Philippines.
- Development of analytical framework and formulation of a model to determine LNG stockpiling requirements for the state of Victoria, Australia.
- Review of constraint representation issues for the Australian national electricity market, and development of “constraint orientation” theory for regional markets.
- Review of proposed electricity market based on bilateral contracting for Western Australia.
- Advice on electricity market design and rules for the Republic of Ireland.
- Advice on the treatment of regional boundaries, and development of an innovative approach to representation and pricing of inter-regional and intra-regional constraints for the Ministerial Council on Energy in Australia

## **Honours/distinctions/membership of societies, institutions, committees**

President (1992-94) Operational Research Society of New Zealand (*Vice-President (1990-92), National Council (1985- 2000), Conference Organiser (1986)*)

Associate Editor (1989- 2001) *Naval Research Logistics: An International Journal* (Wiley)

Associate Editor (1996- ), *Energy Economics* (Elsevier-North Holland)

Chair (New Zealand Electricity Sector (MARLA) Retail Competition Committee

Referee for: *European Journal of Operational Research, Management Science, Asia Pacific Journal of Operations Research, Naval Research Logistics, New Zealand Operational Research, Water Resources Research, International Transactions in OR, The Energy Journal, Pacific-Asia Journal of Energy, Utilities Policy, Annals of OR, Energy Economics*

External Moderator/Examiner/Referee for: *University of Auckland/ University of New South Wales/ Christchurch Polytechnic Australian Research Council/ University of California, Berkeley/ NZ Public Good Science Fund/ ORSNZ*

Keynote Speaker, APORS 97, Melbourne, Australia

ORSNZ National Paper Contributor, IFORS 87, Buenos Aires, Argentina

ALCOA Foundation Visiting Professor, University of Tennessee (1981)

Fulbright Travel Award (1980-1982)

Member, Institute for Operations Research and Management Science (INFORMS)

Member, International Association of Energy Economists

Member, Energy Modelling Forum (Working Group 15 on "The Competitive Electricity Industry")

Member, International Federation for Information Processing (Working Group WG 7.7 on Stochastic Optimisation)

Member, various committees at Canterbury University

## **Professional positions held**

1998-2001. Associate Professor (part time) in Management Science (Currently Adjunct Professor), Department of Management, University of Canterbury

- Developed two day seminar on hydro-thermal power system economics and modelling, and presented to various groups in the New Zealand electricity industry.
- Developed and presented three day Seminar/Workshop series on Dispatch Based Transmission Pricing for Trans Power New Zealand (with B.J. Ring)
- Developed and presented extensive seminars on electricity market issues for the Australian National Electricity Market Management Company, the Singapore Public Utilities Board, and the Philippines Department of Energy.
- Founded and lead the Energy Modelling Research Group, a group of about 10 academic staff, research students and research assistants within the Department, funded by the Electricity Corporation and Trans Power to pursue research into the modelling and economic management of various aspects of the energy and related sectors, as detailed elsewhere.
- Established and chaired a Graduate Research Oversight Committee overseeing supervision of around twenty thesis students in the Department of Management

1989-97: Senior Lecturer (half time) in Management Science, Department of Management, University of Canterbury

1987-89: Senior Lecturer (full time) in Operations Research, Department of Economics, University of Canterbury

1985-87: Lecturer in Operations Research, Department of Economics, University of Canterbury

1983 - 84: Research Group Leader, Planning and Forecasting Directorate, New Zealand Ministry of Energy

- Supervised a group of 4-5 scientists working on the application of economics and operations research techniques to problems in the energy sector.
- Personally responsible for theoretical development, design and initial implementation of models used to optimise operation, development and pricing in the electricity sector from 1985 to 1999.

1982: Academic Visitor in Mathematical Sciences, University of Delaware, Newark

1981-82: Assistant Professor in Management Science, University of Tennessee, Knoxville

1981: Visiting Lecturer in Industrial Engineering and Operations Research, University of California, Berkeley

1981 - 82: Principal Investigator on Research Contract, Water Resources Management Methods, Tennessee Valley Authority

- Researched new methods for dealing with chronological load curves in hydro power scheduling models.

1979 - 80: Scientist, Planning and Forecasting Directorate, New Zealand Ministry of Energy

- Responsible for preparing the electricity section of New Zealand's first Annual Energy Plan (1980), including review of Electricity Division's expansion planning, and of major electricity intensive industrial development proposals.
- Developed mathematical models to determine opportunity costs of natural gas and oil stockpiling strategies for New Zealand.
- Studied related economic issues, particularly pricing, discounting and techniques for dealing with uncertainty in energy planning.
- Developed models and techniques for reservoir optimisation, simulation and economic analysis of expansion plans in the electricity sector.

1978 - 79: Research Fellow, Electricity Division, New Zealand Ministry of Energy

- Developed reservoir management models for System Control.

1976-78: Teaching Assistant in Economics, University of Canterbury

### **Graduate teaching**

- Developed and taught MSCI 454, a graduate course on "Applied OR/MS", with emphasis on applications of managerial economics, decomposition theory and dynamic programming in the energy sector.
- Developed and taught MSCI 455 module on project scoping and proposal preparation for honours project students in Management Science.

### **Grant's publications**

*We're probably missing a few.*

- Pinto, Antonio, John F. Raffenberger, Thomas Cochrane and E. Grant Read, "A proposed smart market design for sediment discharge," forthcoming in *J. Water Resources Planning and Mgmt.*, 2012, doi:10.1061/(ASCE)WR.1943-5452.0000228, <http://ascelibrary.org/wro/resource/3/jwrmxx/167>
- Prabodanie, R. A. Ranga, John F. Raffenberger, E. Grant Read and Mark W. Milke, "LP models for pricing diffuse nitrate discharge permits," *Annals of Ops. Res.*, DOI: 10.1007/s10479-011-0941-0, Aug 2011.
- Read, E.G. (2010) "Co-Optimization of Energy and Ancillary Service Markets." In S. Rebennack, P.M. Pardalos, M.V.F. Pereira and N.A. Iliadis (Ed.), *Handbook on Power Systems Optimisation*, Vol 1. (307-327). Heidelberg: Springer.
- Read, E.G. and Hindsberger, M. (2010) "Constructive Dual DP for Reservoir Optimization." In P.M. Pardalos, S. Rebennack, M.V.F. Pereira and N.A. Iliadis (Ed.), *Handbook on Power Systems* 1. (3-32). Heidelberg: Springer. <http://dx.doi.org/10.1007/978-3-642-02493-1>.
- Tipping, J. and Read, E.G. (2010) "Hybrid Bottom-Up/Top-Down Modeling of Prices in Deregulated Wholesale Power Markets." In S. Rebennack, P.M. Pardalos, M.V.F. Pereira and N.A. Iliadis (Ed.), *Handbook on Power Systems Optimisation*, Vol II. (213-238). Heidelberg: Springer. <http://dx.doi.org/10.1007/978-3-642-12686-4>.
- Stephen Starkey, E.G. Read, S. Dye. and B.J. Ring. (2010) "A Natural Gas LP Formulation to Enhance Allocation with Market Pricing Mechanisms." Auckland, New Zealand: 45th Annual ORSNZ Conference, 29-30 November 2010. 409-417.
- Prabodanie, R.A.R., Raffenberger, J.F., Milke, M.W. and Read, G. (2010) "A pollution offset system for trading non-point source water pollution permits." *Environmental and Resource Economics*, 45(4), 499-515. <http://dx.doi.org/10.1007/s10640-009-9325-1>.
- Raffenberger, John F., Mark W. Milke, and E. Grant Read, "A Deterministic Smart Market Model for Ground Water," *Operations Research*, v57, n6, Nov-Dec 2009, pp. 1333-1346. **Winner**, INFORMS ENRE best paper prize.
- J Tipping, D C McNickle and E.G. Read, "Can the shoe be made to fit? Cournot Modelling for Australian Electricity Prices," *ORSNZ Proceedings*, Auckland, 2005.
- E.G. Read and M. Thomas, "Risk-Adjusted Discount Rates and Optimal Plant Mix: A Conceptual Analysis for Electricity Markets," *ORSNZ Proceedings*, Auckland, 2005.
- J Tipping, D C McNickle and E.G. Read, "A Model for New Zealand Hydro Storage Levels and Prices," *EPOC Proceedings*, Auckland, 2005.
- D. Chattopadhyay, B.B. Chakrabarti and E.G. Read, "A Spot Pricing Mechanism for Voltage Stability," *International Journal of Electrical Power & Energy Systems* (to appear).
- J Tipping, D C McNickle and E G Read, "Incorporating Storage Levels into a Model for New Zealand Spot Prices," *EPOC Proceedings*, Auckland, 2004.
- P Stewart, E.G. Read and R James, "Intertemporal Considerations for Supply Offer Development in Deregulated Electricity Markets," *LAEE Proceedings*, Zurich 2004.
- J Tipping, E G Read and D C McNickle, "The Analysis of Spot Price Stochasticity in New Zealand's Electricity Market," *LAEE Proceedings*, Zurich 2004.
- B.B. Chakrabarti, E.G. Read, "Pricing Implications of Security Constrained Dispatch," *ORSNZ Proceedings*, Auckland, 2004.
- E.G. Read and D. Chattopadhyay, "A Theoretical Framework for Zonal Electricity Markets," *ORSNZ Proceedings*, Auckland, 2004.

E.G. Read, NEM Regional Boundary Issues: Theoretical Framework. Released by the Australian Ministerial Council on Energy, October 2004.

E.G. Read, *NEM Interconnector Congestion: Dealing with Interconnector Interactions*, Released by the National Electricity Market Management Company of Australia, October 2004.

E.G. Read and F.T. Baird, *Network Constraint Formulation: Impact on Market Efficiency*. Released by the National Electricity Market Management Company of Australia, January 2003.

E.G. Read (With CRA staff), *Constraint Orientation: Principles and Pricing Implications*. Released by the National Electricity Market Management Company of Australia, March 2003.

E.G. Read *Dealing with NEM Interconnector Congestion: A Conceptual Framework*. Released by the National Electricity Market Management Company of Australia, March 2003.

E.G. Read, Financial Transmission Rights for New Zealand: Issues and Alternatives. Released by the Ministry of Economic Development, May 2002.

E.G. Read, “Applications of MS/OR in the Electricity Sector” in H.G. Daellenbach (ed.) *The Informed Student Guide to the Management Sciences*, Thomson Learning, London, 2002, p 17-18.

E.G. Read, “Applications of MS/OR in Energy Modelling” in H.G. Daellenbach (ed.) *The Informed Student Guide to the Management Sciences*, Thomson Learning, London 2002, p 18-19.

E.G. Read, (With PA Staff) *Wholesale Electricity Spot Market Clearing Formulation*. Released by the Philippines Department of Energy, November 2000 (with subsequent revisions to 2002).

E.G. Read and J.A. George (With PA/Freehills staff) *Wholesale Electricity Spot Market Rules: the Market*. Released by the Philippines Department of Energy, November 2000 (with subsequent revisions to 2002).

E.G. Read, *Financial Transmission Rights for New Zealand: Issues and Alternatives* Released by the Ministry of Economic Development, May 2002.

E.G. Read (With PHB Staff) *Dispatch/Pricing Formulation Review: Compliance with Market Rules*. Released by the National Electricity Market Management Company of Australia, September 1997 (with subsequent revisions to 2001).

E.G. Read (With PHB Staff) *Dispatch/Pricing Formulation Review: Software Audit*. Released by the National Electricity Market Management Company of Australia, September 1997 (with subsequent revisions to 2001).

E.G. Read and F.T. Baird (With PA Staff) *Singapore Electricity Market Rules: Market Operations*. Released by the Singapore Energy Market Authority, November 2001.

E.G. Read, B. Graydon (With PA staff) Ring *Singapore Electricity Market Rules: Market Clearing Formulation*. Released by the Singapore Energy Market Authority, November 2001.

D. Chattopadhyay, B.B. Chakrabarti, and E.G. Read, “Pricing for Voltage Stability” *Proceedings of the IEEE/PICA Conference*, Sydney, 2001, pp. 235-40.

J.A. George, E.G. Read and A.S. Duffy “Using Cournot Gaming Models for Deciding Vesting Contracts for an Emerging Electricity Market” *ORSNZ Proceedings*, 2001, p295.

B.B. Chakrabarti, E.G. Read, and D. Chattopadhyay “Optimal Reactive Power Management in Electric Power System” *ORSNZ Proceedings*, 2000, p75-6.

Read, E.G. and D. Chattopadhyay. Electricity market models: Lessons from Australasian experience. Procs. ORSNZ 34th Annual Conference, Waikato, 1999: 33-42.

Read, E.G. Dual OR: A partial paradigm for the future?. Procs. ORSNZ 34th Annual Conference, Waikato, 1999: 255-64.



Read, E.G., Drayton-Bright G.R., and Ring, B. J. An Integrated Energy and Reserve Market for New Zealand. 1998, Volume 28, 297-319, DOI: 10.1007/978-1-4615-5729-6\_13. In *Deregulation of Electric Utilities*, Topics in Regulatory Economics and Policy Series, G. Zaccour (ed.).

Yang, Miao, and Read, E.G. A constructive dual dynamic programming for a reservoir model with correlation. *Water Resources Research*, vol. 35, no. 7, p. 2247.

Read, E.G., Electricity sector reform in New Zealand: lessons from the last decade. *Pacific and Asian Journal of Energy*, 1997, vol. 7, no. 2, pp. 175-191.

Kerr, A.L and Read, E.G. Integer Programming Heuristics for Hydro Unit Commitment ORSNZ Proceedings 1996 111.

Read, E.G. Culy, J.G and Wright, B. Structure and Regulation of the New Zealand Electricity Sector in Gilbert, R., Kahn, E. (eds) *International Comparison of Electricity Regulation*, Cambridge University Press 1996 312-365.

Read, E.G. and Drayton, G.R. Using LP to form a market for Spinning Reserve ORSNZ Proceedings 1996 119-124.

Read, E.G. Hogan, W.W and Ring, B.J. Using Mathematical Programming for Electricity Spot Pricing *International Transactions in Operations Research* 3, 3-4 1996 243-253.

Read, E.G. and Ring, B.J. Short run pricing in competitive electricity markets. *Canadian Journal of Economics*. XXIX Special issue, April 1996 S313-15.

Read, E.G. and Scott, T.J. Modelling Hydro Reservoir Operation in a Deregulated Electricity Sector *International Transactions in Operations Research* 3, 3-4 1996 243-253.

Read, E.G. OR Modelling for a Deregulated Electricity Sector *International Transactions in Operations Research* 3, 2 1996 129-138.

Read, E.G. George, J.A and Rosenthal, R.E. Unit Scheduling in a Hydro-electric Power System *INFORMS*, Los Angeles April 1995.

Read, E.G. Ring, B.J and Rosevear, M. Dispatch based pricing: Technical reference. In A. Turner (ed.), *Dispatch based pricing*, Trans Power, Wellington, July 1995 49p.

Read, E.G. and Ring, B.J. Dispatch based pricing: Theory and application. In A. Turner (ed.), *Dispatch based pricing*, Trans Power, Wellington, July 1995 147p.

Read, E.G. and Ring, B.J. Behaviour of Nodal Power Prices in Turner, A. (ed.) *Dispatch Based Pricing for the New Zealand Power System*, Trans Power July 1995 89.

Read, E.G. and Ring, B.J. Dispatch Based Pricing: Philosophy and Methodology in Turner, A. (ed.) *Dispatch Based Pricing for the New Zealand Power System*, Trans Power July 1995.

Read, E.G. and Ring, B.J. A dispatch based pricing model for the New Zealand electricity market in *Transmission Pricing and Access*, R Siddiqi and M Einhorn (eds), Kluwer, 1995 183-206.

Read, E.G. and Ring, B.J. Best Compromise Spot Pricing for an Electricity Market ORSNZ Proceedings 1995 117.

Read, E.G. Culy, J.G and Coad, V.H. OR Models for the Electricity Corporation of New Zealand *Communications of the OR Society of Japan* 39, 1 1994 16-17.

Read, E.G. George, J.A and MacGregor, A.D. Stochastic dual dynamic programming with lagged variables. *Proceedings of the 30th Annual Conference of the O.R. Society of N.Z.* August 1994 145-53.

Read, E.G. Lamar, B.W Drayton, G.R and Turner, A.J. Non-linear Optimisation of Spinning Reserve in an Electrical Power Network *TIMS/ORSA Joint National Meeting* April 1994.

- Read, E.G. and Ring, B.J. Pricing for reserve electricity generation capacity to meet stochastic contingencies. Proceedings, Operational Research Society of New Zealand, Palmerston North, August 1994 154-59.
- Read, E.G. and Ring, B.J. Pricing for Reserve Capacity in a Competitive Electricity Market TIMS XXXII, Anchorage, Alaska June 1994.
- Scott, T and Read, E.G. Hydro-generator gaming in a deregulated electricity market. Proceedings, 10th Conference of the Electrical Power Supply Industry, Christchurch, v1, September 1994 377-87.
- Read, E.G. Ring, B.J and Drayton, G.R. Optimal Pricing for Reserve Electricity Generation Capacity ORSNZ Proceedings 1993 84-91.
- Read, E.G. and Scott, T.J. Optimising Reservoir Management in a Deregulated Electricity Market ORSNZ Proceedings 1993 92-99.
- Drayton, G Lamar, B.W Read, E.G. and Turner, A. Optimization of Generation and Spinning Reserve in an Electrical Power System, Operational Research Society of New Zealand, Proceedings, Christchurch, New Zealand, vol. 28, August, 1992, 142-149.
- Read, E.G. Baird, F.T and Culy, J. Towards a Competitive Wholesale Electricity Market Wholesale Electricity Market Study Report, WEMS/5 October 1992.
- Read, E.G. Culy, J.G and Gale, S.J. Operations Research in Energy Planning for a Small Country European Journal of Operational Research 56 1992 237-248.
- Read, E.G. and Ring, B.J. Aspects of Electricity Transmission Pricing ORSNZ Proceedings 1992 150.
- Read, E.G. and Scott, T.J. Single Period Response Curves for a Duopolistic Electricity Market ORSNZ Proceedings 1992 151-158.
- Read, E.G. Short Run Transmission Pricing Issues in New Zealand Coping with the Energy Future: Markets and Regulations, Proceedings of the International Association of Energy Economists, Tours, France 1992 A17-A24.
- Read, E.G. A Managed Transition Toward a Facilitated Market: Rationale Wholesale Electricity Market Study Report, WEMS/4 October 1992.
- Read, E.G. Wholesale Electricity Market Reform: Analysis of Options Wholesale Electricity Market Study Report, WEMS/3 October 1992.
- Read, E.G. Culy, J.G and Gale, S.J. OR in the Energy Sector: the Impact of Privatisation TIMS XXX, Rio de Janeiro 1991.
- Read, E.G. and Yang, M. DDP Approach for a Reservoir Management Problem with Correlated Inflows Second Triennial APORS Conference, Beijing, China 1991.
- Read, E.G. and George, J.A. Dual Dynamic Programming for Linear Production/Inventory Systems Journal of Computers and Mathematics 19, 11 1990 29-42.
- Read, E.G. and Boshier, J.F. Biases in Stochastic Reservoir Scheduling Models in Esogbue, A.O. (ed.) Dynamic Programming for Optimal Water Resources System Management Prentice Hall NY 1989 386-398.
- Read, E.G. and Sell, D.P.M. Pricing and Operation of Transmission Services: Short Run Aspects In Turner, A. (ed.) Principles for Pricing Electricity Transmission, TransPower August 1989 100.
- Read, E.G. and Sell, D.P.M. A Framework for Transmission Pricing In Turner, A. (ed.) Principles for Pricing Electricity Transmission, Trans Power August 1989 80.
- Read, E.G. Pricing and Operation of Transmission Services: Long Run Aspects In Turner, A. (ed.) Principles for Pricing Electricity Transmission, Trans Power August 1989 132.

Read, E.G. A Dual Approach to Stochastic Dynamic Programming for Reservoir Release Scheduling in A.O. Esogbue (ed) Dynamic Programming for Optimal Water Resources System Management Prentice Hall NY 1989 361-372.

Read, E.G. Management of Hydro Storage Released by Government Task Force on Electricity Sector Structure 1989.

Read, E.G., Culy, J.G., Halliburton, T.S., and Winter, N.L., A simulation model for electricity planning in New Zealand. Operational Research, 1988.

## Grant's service to NZ operations research

In 1979, Grant was the first to complete the Canterbury O.R. degree. He returned years later, and arranged funding for the Energy Modelling Research Group, and helped supervise the majority of Canterbury O.R. doctoral theses in the past 20 years. Canterbury O.R.'s reputation in electricity markets is due entirely to Grant.

In service to the ORSNZ, Grant has been a Conference Organiser (1986), been on the National Council (1985- 2000), was Vice-President (1990-92), and then president of the ORSNZ (1992-94), in addition to perennial interesting papers to the ORSNZ Conference, and supporting others in doing the same.

Grant has served:

- as associate editor for *Naval Research Logistics*, *Energy Policy*, and *Energy Systems*,
- on the editorial board for *Economics of Energy & Environmental Policy*,
- referee for *European Journal of Operational Research*, *Management Science*, *Asia Pacific Journal of Operations Research*, *Naval Research Logistics*, *New Zealand Operational Research*, *Water Resources Research*, *International Transactions in OR*, *The Energy Journal*, *Pacific-Asia Journal of Energy*, *Utilities Policy*, *Annals of OR*, *Energy Economics*, 2012 CIGRE conference.

During his employment at Canterbury, Grant supervised PhD students

1. Andrew Kerr,
2. Ollie McCahon,
3. A. Ward,
4. Gavin Bell,
5. Tristram Scott,
6. Glen Drayton,
7. Brendon Ring,
8. M. Yang,
9. A. McGregor,

**Since retiring from the University**, with no compensation but a desk (and even the desk is no longer available), Grant has:

- supervised *more* PhD students:
  10. Indra Mahakalanda,
  11. Stephen Starkey,
  12. Peter Jackson,
  13. Ranga Prabodanie,
  14. Antonio Pinto,
  15. Paul Stewart,
  16. James Tipping,
  17. B. Chakrabarti,
  18. Brent Painter,

19. Steve Batstone,

- supervised Honours projects,
- taught MSCI 454, a graduate course on “Applied OR/MS”, with emphasis on applications of managerial economics, decomposition theory and dynamic programming in the energy sector.
- taught MSCI 455 module on project scoping and proposal preparation for honours project students in Management Science.
- refereed graduate theses and numerous papers.
- maintaining the University’s research record by logging his publications.
- served as the principal intellect in the Water Markets Research Group, patiently tutoring students and staff alike on market intricacies, in conversations, in emails, and dozens of seminars.