



LANCE HOCH EXECUTIVE DIRECTOR

Coursework in Ph.D. program
Energy Management and Policy
University of Pennsylvania

M.A., American Studies
University of Pennsylvania

B.A., Sociology
Vassar College

PRIOR PROFESSIONAL HISTORY

- 2008 - present Executive Director, Oakley Greenwood Pty Ltd
- 2000 - 2008 Vice President, CRA International Pty Ltd
- 1999 - 2000 Vice President, PHB Hagler Bailly Asia Pacific Pty Ltd
- 1999 - 1999 Independent Consultant
- 1990 - 1999 Managing Director, SRC International Pty. Ltd. (Australia)
- 1987 - 1990 Vice President, TechPlan Associates
- 1985 - 1987 Project Director, Portfolio Associates
- 1982 - 1985 Manager Evaluation & Analysis, Synergic Resources Corporation
- 1980 - 1982 Renewable Energy Resource Specialist, Governor's Energy Council, PA
- 1976 - 1980 Manager of Demonstration Data, National Solar Heating and Cooling Center

OVERVIEW

Lance Hoch has 40 years of experience as a consultant to the electricity industry and the government and regulatory agencies that are involved with it. He specialises in utility/customer interface issues and has expertise in demand management, energy efficiency, pricing, regulation and policy matters in the distribution and retail portions of the electricity supply chain, and has worked on projects in these areas in Australia, the US, the UK, New Zealand, the Pacific Islands, Hong Kong, the People's Republic of China, Indonesia, Thailand, India, Sri Lanka, Saudi Arabia and the United Arab Emirates.

He has been involved in energy efficiency and demand management and demand response (collectively DSM) throughout his career, having designed more than 50 DSM programs for electricity utilities in the US, Australia, New Zealand and southeast Asia, and has in-depth expertise in the economic rationale for, and the design and implementation of DSM programs in both regulated and deregulated markets.

He started his career in the US in the late 70s and was one of the earliest designers of energy efficiency programs for the US and various state governments. He was deeply involved in the transition of the sponsorship of these programs from the government to the utility industry, as well as the development and use of benefit-cost analysis to assess the value of utility demand-side programs. He was the designer of BENCOST, one of the first software applications of the California (CPUC) Method for assessing the benefits and costs of DSM programs from the perspective of the utility, participating customers, non-participating customers, all utility customers, and society at large.

He moved to Australia in 1990 when the State Electricity Commission of Victoria announced that it was going to fund an AUD50 million DSM program, and he became one of the primary designers of DSM programs under that umbrella. When the Australian electricity industry was unbundled, privatised and de-regulated, he assisted in developing mechanisms by which utility demand-side activities could be incorporated within the new industry and market design. He provided advice on similar matters in the re-design of New Zealand's electricity industry and market.

Here, in addition to his involvement in DSM, he has been involved in many the studies of the potential benefits of the deployment of interval metering and advanced metering infrastructure (AMI) that have been undertaken in Australia. In these studies, he has assessed the benefits of these systems to the distribution network, the wholesale market, and consumers. He has expertise in the assessment of the operational benefits AMI can provide to the distribution system and has also assessed the potential for these systems to support innovative and more cost-reflective price signals, customers' reactions to and acceptance of those price signals, and their potential for assisting in increased levels of demand response that provide benefits to both the electricity system and electricity end-users.

He has considerable experience in the development of 'standard offer' retail electricity tariffs and related topics. He directed a review of the effectiveness of retail competition in Victoria for the AEMC, and has played a key role in assignments for AEMO (and its predecessor, NEMMCO), MCE, and a number of the jurisdictional electricity distribution companies and national and new entrant electricity retailers. He directed the work required to set the notified price (standard tariff) for small electricity users in Queensland for the first three years of FRC in that state, and contributed to the review and setting of regulated retail prices in two other jurisdictions.

Lance has also provided pricing advice to several electricity retailers and has planned and managed market surveys of competitive retail electricity market offers for residential customers for several electricity retailers and the AEMC. He has also participated in several distribution price determinations.

He has also participated in several studies that have assessed the benefits and costs of full retail contestability and the various approaches for implementing this major reform to the electricity market. In these assignments he has been particularly involved in considerations concerning the implications of market design and objectives for the relative advantages, disadvantages and costs of fully metered approaches and load profiling approaches, as well as the overall benefits and costs of full retail competition.

RELEVANT EXPERIENCE

Development of Policy Mechanisms and Programs to Support and Evaluate DM, Energy Efficiency and Renewables in the Wholesale and Retail Portions of the Electricity Value Chain

Cost Benefit Assessment of the Demand Response Mechanism

Lance led a project that was commissioned by the Commonwealth Department of Industry to conduct a cost-benefit assessment of the Demand Response Mechanism (DRM) that had been proposed as part of the AEMC's Power of choice review. The review included:

- individual and group interviews with different categories of stakeholders, including retailers, distributors, third-party demand-side aggregators, individual (large) energy users and industry representative groups;
- bottom-up assessment of the incremental amount of demand response that could become available due to the DRM;

- wholesale electricity market simulation modelling to assess the impact of the DRM on wholesale market price;
- estimation of the impact of the change in wholesale price on retail electricity prices;
- review of the information provided by retailers, distributors and AEMO regarding the costs that would be required to their IT systems to implement and administer the DRM; and
- quantification of the overall costs and benefits of the proposed DRM.

On the basis of the findings, which showed that the DRM was not cost-justified based on the wholesale prices that pertained at the time and were forecast to pertain into the future, the study recommended that the DRM be introduced on a small-scale to provide real-world information on its potential impacts and the costs that would actually be incurred by market participants. This recommendation was also made so that the mechanism would have been trialled and able to more fully implemented and ramped up in the event that wholesale market conditions warranted.

Policy Options for Putting Downward Pressure on Electricity Prices

Led a study for a consortium composed of the Australian Industry Group, Brotherhood St Laurence, CHOICE and the Energy Efficiency Council that sought to identify policy initiatives that could put downward pressure on electricity prices in response to the significant price increases that occurred between roughly 2009 and 2012. The study identified a total of 19 options across the various parts of the electricity supply chain. The sponsoring organisations put forward a joint set of policy proposals drawing on our report. Mr Hoch assisted the consortium in presenting their proposals to various state and Commonwealth officials as well as a senate Committee that had been convened to consider this issue my then Prime Minister Julia Gillard.

Incorporation of Peak Demand in the Design of a National Energy Savings Initiative

For the Commonwealth Department of Climate Change and Energy Efficiency (DCCEE) co-led a project that identified and assessed alternatives that could be incorporated within the design of a National Energy Savings Initiative (NESI) to reduce the potential for measures undertaken in the program to reduce annual or seasonal system load factors and therefore place upward pressure on average electricity prices. The project also involved considerations or whether peak demand reductions should be incorporated within the energy efficiency reward mechanism or treated as a separate obligation, and if so, on what party that obligation should be placed.

Peer Review of the Modelling of the Impact of a National Energy Savings Initiative on Distribution System Peak Demand

For the Commonwealth Department of Climate Change and Energy Efficiency (DCCEE), provided peer review of the modelling of the impact that a national Energy Savings Initiative would be likely to have on the peak demands of the distribution systems within the NEM.

Stocktake and Assessment of Energy Efficiency Measures and Policies that Impact on or Seek to Integrate with the NEM

Led a team of consultants in this assignment, which was part of the AEMC's Power of Choice (DSP3) Review. The project involved reviewing the impacts, costs and benefits of four Australian white certificate and other energy efficiency programs: the Victorian Energy Efficiency Target (VEET), the NSW Energy Saving Scheme (ESS), the South Australian Residential Energy Efficiency Scheme (REES), and the Commonwealth's Energy Efficiency Opportunities (EEO) program. In addition, between 8 and 10 international programs that use targets and/or obligations on electricity market participants to implement energy efficiency and demand reduction measures are also being reviewed.

Based on the findings of these reviews, the project also identified and recommended a best practice model for the design and governance of energy efficiency measures/policies that seek to promote efficient investment in and use of DSP in the electricity market.

Impact of the NSW Energy Savings Scheme on Peak Demand

Served as the lead technical consultant on this study, which was commissioned by the NSW Office of Environment and Heritage (OEH) to estimate how large an impact energy efficiency technologies (referred to as EEMs in the study) installed under the NSW Energy Savings Scheme could have on peak demand electricity infrastructure requirements. OEH used the results in assessing the potential value of, and possible policy mechanisms for, incentivising reductions in peak demand.

Two approaches were used to assess the peak demand reductions and consequent benefits from the widespread adoption of EEMs:

- static analysis, based on the long-run average incremental cost of electricity infrastructure
- market modelling.

For both analyses, a group of 16 EEMs were identified from existing research. In the static analysis, the technical potential of these EEMs was estimated in terms of:

- annual energy savings
- impact on summer peak demand
- impact on winter peak demand
- installed cost and likely useful life, and
- the number of facilities (i.e., households or businesses) in which it would be technically feasible to implement the measure.

These measures of potential were then used to estimate the cost-effectiveness of each measure as a means of replacing electricity infrastructure and the magnitude of the potential benefit available from each measure and all of the measures in aggregate.

Both analyses found that the selected EEMs have very significant technical potential for reducing the amount of electricity infrastructure needed to meet peak demand.

Assessment of the Impact of the CPRS on the Generation Sector

For the National Generators Forum, assessed the impact of the Government's proposed CPRS on the generation sector. The analysis included consideration of the Renewable Energy Target and forecast the generation and energy mix that would result from these policy settings over the period to 2050, and quantified the financial and dispatch impact on different types of generation plant.

Funding Level for the Sustainable Energy Fund

Served as Project Director and assessed the potential for incremental energy efficiency improvements and associated greenhouse gas emission reductions in New South Wales, and the portion of this that could be achieved by the Sustainable Energy Fund, a mechanism initiated by the state government to encourage energy efficiency and environmental improvement projects. Based on the results obtained, Mr. Hoch prepared recommendations for the level of funding that would optimise the workings of the Fund. Subsequently, the New South Wales Government authorised the funding level recommended by Mr. Hoch. The name of the organization administering the funds was subsequently changed to the Sustainable Energy Development Authority (SEDA).

New Zealand's Energy Saver Fund

Assisted the New Zealand Energy Efficiency and Conservation Authority (EECA) in developing the Energy Saver Fund (ESF), which provided funding for energy efficiency projects proposed by energy utilities, community groups, government agencies and the private sector. Funds were disbursed through a series of five competitive bid cycles. In his role as the lead architect of the ESF:

- Developed the rationale on which Government approved five-year funding for the ESF as the preferred means for providing a transitional policy to encourage energy efficiency as market mechanisms matured in the deregulated electricity market;
- Worked with a group of diverse stakeholders from the electricity and gas industries, environmental groups, and consumer advocacy groups to develop the broad design of the Fund and its operating parameters;
- Designed all aspects of the operation of the Fund including eligibility requirements of bidders and projects, scoring parameters by which bids would be scored and funds disbursed, communication and outreach efforts to inform potential bidders of the opportunity and provide a basic level of assistance to interested bidders, development of an electronic bid package that provided a standardised bid format and allowed automated bid scoring; and
- Assisted in reviewing and scoring bids in the first three cycles in the program.

Forecast of Take-up in NSW's Solar Bonus Scheme

Assisted EnergyAustralia in forecasting the level of take-up of residential photovoltaic systems that would occur within its service area in response to the NSW Government's original 60c/kWh gross feed-in tariff, and its revised 20c/kWh program. Metrics of interest included number of systems installed and energy generated. These data were used by EnergyAustralia to estimate the impact of the payments it would be called upon to make to participating customers under the program (and which originally were to be recovered in distribution charges), and the costs it would incur in administering the program.

Assessment of the Potential for Renewable Energy Generation

For an international generation company, participated in an assessment of the resource potential and regulatory environment associated with the development of renewable electricity generation facilities. The project investigated potential in eight Asia Pacific countries: Singapore, PRC, Philippines, Japan, Australia, New Zealand, Korea and Thailand. Other CRA offices assessed countries in North America and the Caribbean. Mr. Hoch was responsible for the assessment of the Philippines.

Assessment of Barriers to Take-up of Solar Hot Water

For the South Australia Office of Energy Planning, Renewable Energy Working Group, Mr Hoch conducted a conjoint analysis to assess specific barriers and obstacles acting as impediments to the increased market penetration of solar water heaters. He also devised an incentive package and implementation plan to cost effectively reduce these barriers and significantly increase the penetration of solar hot water heaters.

Development of the Technical Basis for a National Commercial Building Code for Australia

As Project Director, Mr. Hoch directed a multi-phase project which included assessment of cost-effective energy efficiency opportunities in new commercial construction and refurbishment by building type, development of the technical basis for a national commercial energy building code, cost-benefit analysis to determine the optimal stringency level for the code, and identification of the most promising institutional arrangements for further development and implementation of the code.

Framework for the Evaluation of Demand-Side Management, Renewable Energy and Energy Conservation Programs

The Victorian Government's Energy Efficiency Strategy called for the development of an evaluation plan that could be carried out by each of the individual energy authorities in the State. For the Department of Manufacturing & Industry Development (DMID), Mr Hoch reviewed current evaluation activities and developed the methodological approaches and processes required to meet the needs of a consistent portfolio-wide evaluation framework. He also produced an Evaluation Framework and Implementation Guidebook, and conducted training for DMID staff.

Evaluation of the Greenhouse Challenge Program

Served as the Project Director in an assignment for the Australian Greenhouse Office to evaluate the Greenhouse Challenge Program, the flagship of Australia's National Greenhouse Strategy. Key areas in which Mr. Hoch was involved include: investigation of free-rider and free-driver impacts, assessment of key program delivery successes and failures, assessment of remaining and untapped market potential, and the development of recommendations for improvements in program marketing and delivery.

Reserve Capacity for Synergy

Led a consulting team that designed all aspects of the Peak Demand Saver Program for Synergy Energy (formerly Western Power). The program was developed after a shortfall in gas energy supply forced a 5-hour brownout in Perth in 2005. The Peak Demand Saver program, which was developed, marketed and delivered within 6 months, signed up 91 MW of interruptibility and delivered over 85% of this capacity on the two times it was called the following summer. On the strength of this performance, Synergy continued the program for the following two years as part of its means of meeting its capacity obligation to the IMO.

Pool Pass-Through with DSM Product as an Alternative for South Australian Grace Period Customers

Lance assisted an electricity retailer in developing a product aimed at small commercial and industrial customers in South Australia (SA) who were facing the end of the Grace Period Tariff at a time when the market was offering few alternatives. The product featured spot-market price pass-through with assistance in identifying and deploying demand reductions to mitigate the impact of price excursions. The product allowed the retailer to participate in the SA market at a time when contract cover was virtually unavailable, and provided customers with a realistic alternative to the default tariff and available contract offers.

Demand Response Cooperative

Assisted a Victoria (Australia) electricity retailer to establish a demand-response cooperative. The program was a good example of the extent of initiative that an electricity retailer will take regarding demand-side activities when they address strategic and commercial objectives of importance to the company. In this case, the retailer recognised that demand-side initiatives can deliver financial, customer satisfaction, market differentiation and customer attraction benefits. Specific activities undertaken included:

- Identifying the most promising customer types to target, and recruiting customers for a trial program;
- Developing all program pricing strategies and operational parameters;
- Developing program marketing materials and training in-house staff in their use; and
- Advising the retailer on how best to structure the program to ensure its ability to meet the requirements that are likely to be developed regarding demand-side bidding and ancillary services.

Addressing the 'Top End' Problem

For the National Electricity Code Authority, assessed the retailers use of customer demand response as a physical hedge against high spot prices, and the degree to which changes in market rules might improve the potential for demand response in addressing the “top end” problem.

Value of Demand Response in the NEM

Led a major assignment for the International Energy Agency (IEA) which assessed the value of demand response in the NEM in terms of its effect on wholesale market price (both super-peak and weighted average price), system reliability (in terms of unserved energy levels), capacity and energy generation mix and associated system capex requirements, and market power. The analysis was undertaken under assumptions of least-cost planning and market bidding, and revealed that the benefits of demand response under market bidding conditions were actually larger than those that accrue in a least-cost planning environment.

Value of Demand Response to Victoria

Led a study for VENCORP, the Victoria government entity charged with assessing the match of electricity supply and demand within the state, which provided early indications of the potential for demand response to reduce pool price excursions (including consideration of the observed bidding behaviour of NEM generators), and thereby put downward pressure on energy prices to all customers.

Development of a Whole of Business DM Strategy for Integral Energy

Developed a whole-of-business DSM strategy for Integral Energy. Network and retail uses for DSM were assessed to identify those that could be combined in a manner and with a message that would be consistent with the company’s overall brand positioning. Ten strategic initiatives were identified as providing overall value to the company on a whole-of-business basis, with four being selected for prioritised implementation. Applicable program designs were also explored, as were enabling regulatory mechanisms.

Demand Response Potential

Estimated the amount of demand response that could be engendered through active utility promotion of interruptible load arrangements the Victorian Electricity Distribution Businesses. Specific topics addressed in the study included identification of most likely customer types to participate in such an initiative based on end-uses, design of a variety of incentive arrangements to induce participation in interruptible load arrangement, conduct of a set of in-person interviews with a sample of customers from these customer groups to better estimate the amount of demand response that is technically available and that is likely to come forward in response to the various incentives, extrapolation of survey results to the state as a whole, and recommendations to the Victorian Electricity Distribution Companies regarding the role they could play in providing this capability.

Adequacy of Demand Response

- Significantly contributed to a study conducted for the National Grid Management Council investigating the adequacy and likely impact of the Grid protocol in producing demand response to price signals from distribution companies and end-use customers. The study, undertaken with ACiL Economics, included in-depth interviews with industry decision makers, a review of overseas experience and computer modelling.
- For the National Electricity Code Authority, assessed the current use of customer demand response on the part of electricity retailers as a physical hedge against high spot prices, and the degree to which changes in market rules might improve the potential for demand response in addressing the “top end” problem. In an earlier project for NECA, conducted a review of the extent to which Australian electricity retailers are offering interruptible load arrangements to end-use customers, their motivations for doing so, and the specific commercial arrangement of these offers. Comparisons to activities and market conditions in the UK and the US were also investigated.

Magnitude and Potential Benefits of Demand Response

For VENCORP, directed a study that assessed the magnitude of demand response (DR) currently available in Victoria, identified the specific impediments hindering deployment of additional DR, estimated the incremental amount that could be deployed if the barriers could be removed, and provided recommendations regarding actions that the Victorian Government could undertake, consistent with NEM principles, to mitigate the barriers identified. The study also provided a preliminary assessment of the potential impact of DSP on spot prices in Victoria.

Demand Management for Networks

AEMC Strategic Priorities and DSP3

Assisted Ausgrid in responding to the issues raised in the AEMC's Strategic Priorities Discussion Paper regarding demand response, including the development of an incentive mechanism for networks to take a more proactive role in developing demand response capability.

Assessment of the Potential for Demand Management to Reduce Capital Expenditure Requirements of ETSA Utilities – ESCOSA

Led a major assignment for the Essential Services Commission of South Australia (ESCOSA), the state's independent electricity regulator, which demonstrated that demand-side management strategies - including technology promotions and pricing initiatives - could have a meaningful impact on the utility's need for capital. Based on the study's results, ESCOSA intends to provide approximately A\$15 million over the next five years to enhance the utility's capabilities in demand management, including the conduct of load research to establish an information base for demand-side planning, and the design and implementation of up to a half dozen demand-side programs aimed at deferring the need for capital expenditures on low load factor system augmentations.

Statewide Network DM Strategy

Conducted a major study jointly funded by the Queensland electricity network businesses (Powerlink, Energex and Ergon Energy) to develop a statewide strategy for DM focussed on delivering network and customer benefits. The recommendations of the study were accepted by the state government, and have served as the basis for the DM programs that were undertaken subsequently by both Energex and Ergon Energy, and that continue until the present time, including the \$114 million in DM programs that Energex proposed in its most recent price determination and which were approved by the AER.

Engagement of Non-Network Support for TransGrid

Served as the lead consultant to TransGrid in implementing the largest non-network procurement ever undertaken in Australia, and one of the largest in the world. This assignment included development of the Request for Proposals and associated technical information, the criteria and scoring method used in evaluating the proposals, and the contractual instrument through which TransGrid contracted for demand response from demand-side aggregators.

Development of DSP Capabilities for Transpower

Assisted Transpower in New Zealand in implementing a pilot and a trial program to test the potential of demand-side resources to defer augmentation or reduce hours or load at risk in the years immediately preceding augmentation. Also developed the criteria for evaluating the proposals and assisted in evaluating the proposals received. Served as the principal consultant in developing the contract under which the successful aggregators of DSP were engaged by Transpower. That contract has served as the model for the development of the company's Grid Support Contract.

Integrated Planning Process for Sydney Electricity

Led the development of an Integrated Planning Process for Sydney Electricity (now Ausgrid). The objective of this thorough-going revision to the distribution business' planning process was to include consideration of the potential of beyond-the-meter technologies and usage changes as means for meeting aggregate consumer demand on a localised level at least cost.

The exercise involved interviews and facilitated workshops with personnel from a range of departments within the business including: forecasting, network planning, network operations, asset management and pricing. These workshops identified:

- the responsibilities and key objectives/concerns of each of the groups within the overall planning process
- the current planning processes used by each of the groups and the timeline on which they are carried out

- the flow of information between the groups; that is, what did each group need from the others to undertake its work, and what did each group provide to the others

With these processes and objective clearly defined, he worked with each of the groups and across all of the groups to identify how the consideration of beyond-the-meter technologies and usage changes could be incorporated.

The output was a re-designed planning process that was adopted by the business, and served as the foundation for its establishment of one of the first demand-side planning groups in the electricity distribution sector, and Ausgrid continues to be one of the most active distribution businesses in the demand-side planning and implementation. Interestingly, the Sydney Electricity staff member that headed the initial demand-side planning group is now the Manager of Network Planning overall.

Impact of Embedded Generation on System Stability

For NEMMCO, led two projects that estimated the potential impacts of the simultaneous (even if not co-ordinated) deployment of large volumes of demand response and embedded generation (including renewables) on the stability of the power system. This included estimation of the quantity of these resources likely to emerge in the next 5 to 10 years in each NEM region.

Demand Management for Beaudesert – SEQEB

Served as one of the main contributors to a project that designed a set of demand management programs to assist the Southeast Queensland Electricity Board (SEQEB) defer three different network capacity augmentation projects that were being driven by peak demand growth.

The program was successful in deferring the need for capital investment for over three years. This saved the company a significant amount of money during those three years and sustained improvement in its financial performance by improving the network system load factor.

Review of DSM Options for EnergyAustralia

Directed a study that reviewed the case for demand-side management by electricity distribution utilities, and assessed the applicability of a range of DSM program designs and DSM technologies to EnergyAustralia's needs.

Managing Peak Demand Growth

Was one of the principal consultants that assisted Integral Energy in assessing and trailing a set of pricing and demand-side options for managing very high growth in peak demand (and corresponding reductions in load factor) in Integral Energy's network service area. Initial work documented that (a) the growth in peak demand was attributable almost entirely to the growth in penetration and use of air conditioning in the residential and small commercial sectors, and (b) due to the current tariff structure, there was a cross subsidy of approximately A\$100 million per year from non-air-conditioning residential customers, who tend to be smaller users with lower incomes, to customers with air-conditioning. Subsequent steps involved development of an end-use demand forecasting model and capability for the utility, load research and conditional demand analysis to populate the model, and the development and trailing of a set of pricing and demand management options that can help control peak demand growth and reduce the cross subsidy.

Demand Management Opportunities in the Northern Rivers Area

Managed a project in which a Demand Management survey of the Northern Rivers area was conducted. Project sponsors included Pacific Power (the generator), Transgrid (the transmission company), the New South Wales Office of Energy, Northern Rivers Electricity (NRE, the distributor), and the New South Wales Independent Pricing and Regulatory Tribunal (IPART).

As part of the study, Mr. Hoch analysed the financial impact of demand management on the various levels of the utility industry (e.g., generator, transmission company, and distribution network) under several different revenue regulation regimes. One was the then-current rate of return approach. Another was a full revenue cap, and the third was a partial revenue cap. Results revealed that the full revenue cap would produce the most effective financial incentive to the distribution entity to conduct DSM. Based on these results, IPART adopted a revenue cap as the economic basis for regulation of the state's electricity distribution utilities.

AMI and Smart Grid – Benefits and Costs, Pricing Trials and Impacts on Peak Demand

Re-baselining of the AMI Program Benefits

For the Victoria Department of Economic Development, Jobs, Transport and Resources, Lance recently played a major role in re-baselining the benefits anticipated in the Victorian rollout of smart electricity meters. The re-baselining updates the values used for key parameters that are outside the control of the Vic government and the distribution businesses that carried out the deployment. These include parameters such as wholesale electricity price. Benefits based on the wholesale electricity price were originally calculated on the forecast of wholesale prices that existed at the time the original benefit cost assessment was undertaken. Changes in the actual wholesale price as compared to the forecast cannot be controlled by the Vic government and therefore result in windfall benefit gains or losses for the program. Re-baselining removes this effect and allows better understanding of the degree to which the performance of the parties responsible for the rollout contributed to the anticipated benefits being realised.

Development of a Performance Management Framework for the VIC AMI Program

For the Victoria Department of Economic Development, Jobs, Transport and Resources, Lance recently played a major role in designing and delivering a software tool to be used by the Vic government responsible for the AMI rollout in managing the realisation of the benefits anticipated from the program. The tool identifies the degree to which each benefit is tracking anticipated benefit realisation, the reasons for over- or under-achievement, and the risks associated with achieving forecast benefit levels. This can then be used by program office management in prioritising resources and activities to those benefit areas that offer the best opportunity for maximising program benefits given past performance and future prospects.

Implications of the National Metering Framework for WA

Currently leading a project for the WA Public Utilities Office that is assessing the issues and risks associated with the state's potential transition to the national metering framework. The most relevant issues in WA's case are the facts that (a) the state government wants to reduce or cease its involvement as the funder of electricity infrastructure to reduce the call of the sector on state budget resources, and (b) the small end of the electricity market has not yet been opened to retail competition and is currently served by a single, government-owned incumbent retail business. Full retail competition is scheduled to be introduced in WA's retail electricity market at about the same time the national framework would introduce metering competition, and this confluence could pose a significant threat to the ability of new entrant retailers to operate in the market and therefore to the effectiveness of competition overall.

Potential impact of proposed national metering competition arrangements for Victoria's AMI program

In 2015 led a project that assessed the potential impact of the introduction of competition in the provision of electricity meters and separately, the delivery of associated required and optional metering data services. The main issue in this regard was that the metering competition framework that is currently the subject of a Rule change proposal was designed in large measure to increase the deployment of smart metering in the small end of the electricity sector. By contrast, this has already been universally delivered in Victoria - where the primary issue involves the ability to make more effective use of the functionality of the meters, which is primarily an access issue rather than one of infrastructure deployment.

Assessment of the Benefits Realised in Victoria's AMI Program through 2014

For the Victorian Department of Economic Development, Jobs, Transport and Resources led an assessment of the benefits realised through the end of 2014 due to the mandated roll-out of smart meters to small electricity customers in Victoria. This included development of a model that could be used by the Department in future years to continue benefit tracking, and identification of the key issues and risks likely to affect future realisation of AMI benefits and the actions that Government could take to address and mitigate those risks.

Facilitation of a Stakeholder Workshop on the Benefits and Deployment of Smart Meters

Lance served as the co-planner and facilitator of a full-day workshop for stakeholders in the Vic smart meter rollout. The workshop was held about two years into the deployment period at which point a number of problems including poor consumer and community reaction were evident. The workshop included consumer representative groups, electricity distributors, electricity retailers, third party electricity service providers, government officials and electricity market body representatives. The workshop addressed the following topics:

- The perspective of each of the groups regarding what the purpose and benefits of the rollout were and their perceptions of how well the rollout had addressed the concerns of each group and the benefits anticipated (and the problems encountered)
- What each group thought a successful outcome would look like five years from now
- What steps were needed to transition from where things were at that time to that successful point
- The role and actions each of the groups could take to assist with that transition.

Costs and benefits of a new and replacement policy for NSMP-compliant AMI meters

Led a project in 2013 for the Environment and Sustainable Development Directorate of the ACT government in which he assessed the cost and benefits of requiring all meters installed in new and replacement situations to be compliant with the with the *Smart Meter Infrastructure Minimum Functionality Specification* (SMIMFS), as published by the Council of Australian Governments Standing Council on Energy and Resources (SCER) in November 2011 (the *minimum specification*). The study determined that the requirement would not be cost-effective.

Review of Benefits and Costs of the Victorian Smart Meter Rollout

Led a project in 2010 which critically reviewed the most recently available estimates of the benefits of the Victorian Smart Meter Rollout, and refined them considering most recently available information and OGW's knowledge and experience of the dynamics of the distribution and retail sectors. The revised benefit estimate was combined with the most recent assessment of the costs of the rollout to provide a benefit/cost assessment. Results indicated that the rollout would be cost beneficial.

Assistance in Preparing the First SGSC Monitoring & Measurement Report

Assisted Ausgrid SGSC Project management in preparing the first Monitoring and Measurement Report (MMR) for the Smart Grid, Smart City project. The MMR is a key deliverable in this \$93 million Commonwealth government funded program. The purpose of the MMR was to provide a framework for and an outline of the approach to be taken over the course of the SGSC Project for identifying, collecting, managing, analysing and reporting and disseminating the findings and results of the SGSC Project to the various audiences likely to be interested in it.

Independent Assessment Panel for the Australian Commonwealth Government's Smart Grid Smart Cities Program

Served on the 5-member panel appointed by Australia's Minister for the Environment to provide advice on the Commonwealth's Smart Grid, Smart City program which is providing A\$100 million to a consortium led by Ausgrid (formerly EnergyAustralia) to develop and operate an at-scale smart grid. A significant responsibility within this assignment was to identify the data required from the program to guide further policy development regarding smart grid deployment in Australia including the selection of candidate technologies and suitable market and regulatory arrangements.

National Benefit/Cost Assessment of Smart Meters

Played a significant role in a national study of the benefits and costs of AMI that was commissioned by Australia's Ministerial Council on Energy (MCE) in 2007-08. In that study he had the lead responsibility for assessing the impact of smart metering infrastructure on:

- peak demand, spot market prices, and unserved energy in the wholesale electricity market,
- capacity augmentation requirements of electricity distribution systems, and
- greenhouse gas emissions.

He also played a contributing role in the portion of the MCE study that assessed the benefits that smart meters could provide to the operations of electricity distribution entities.

Development of a Metering Business Strategy for MACS

Led a strategic review of MACS' metering services in 2007. The work included a review of the current operations of CLP Power's Metering Department, information gathering on world class practices for metering businesses, and the development of a set of recommendations and roadmap for their implementation by CLP Power that would be appropriate in CLP's (then) current market and regulatory environment, but that would also allow it to position the metering business, given the changes that could be expected to take place in the event that competition were to be introduced in the Hong Kong (or South China) electricity market.

The three market scenarios that were considered were: (a) revised Scheme of Control and therefore limited scope for competitive activities, (b) single buyer market structure with no franchise protection, and (c) full retail competition and unbundled network pricing. Specific recommendations were provided for improving the current operations of the Metering Department and for positioning CLP for the future.

Benefits and Cost of Advanced Metering Infrastructure – Victoria Government

Played a lead role in the two assessments of the benefits and costs of interval meters and the addition of two-way communications commissioned by the Victoria Government that led to its decision to undertake a mandated universal roll-out of the technology.

The first study assessed the costs and benefits of a roll-out of manually read interval meters that were capable of having two-way communications functionality added later. Results suggested that benefits would significantly exceed costs, and on that basis, the Victorian government decided to mandate the deployment of interval meters for all customers on a new and replacement basis.

Subsequently, the Victorian government commissioned an assessment of the incremental benefits and costs of adding the two-way communications capabilities. Once again, benefits were found to exceed costs (though on an incremental basis), but the nature and economics of the communications technology suggested that net benefits would be maximised by undertaking the roll-out on a geographic rather than a new and replacement basis. Based on the findings, the Victorian government mandated the roll-out to be completed in a period of four years.

At present, approximately 90% of the meters have been deployed, but concerns regarding the potential difficulties that portions of the residential customer base may face in responding to the time-of-use price signals that the electricity distribution companies planned to implement using the capabilities of the new meters prompted the Victorian government to impose a temporary moratorium on the implementation of such pricing. This was lifted in June 2013, and a flexible price (TOU) opt-in tariff is now available, but has achieved only very limited take-up (less than 1% of households).

Design of Smart Meter Pricing Trials in Australia's Solar Cities Program

Provided expert assistance to three consortia preparing competitive bids to secure funding from the Australian Government's A\$75m Solar Cities program. The program provided funding for mass-market rooftop photovoltaic projects, energy efficiency, 'smart' metering, innovative electricity pricing, and demand management measures for household and commercial applications.

In all cases, part of the assistance he provided was the design of trials to test retailer and customer reaction to and take-up of innovative pricing approaches made possible using smart metering, and to assess the impact of the various procuring approaches on customers' load profiles, bills and satisfaction levels.

Two of the three consortia that Lance assisted were successful in their bids.

Distribution and Transmission Pricing

Strategic Pricing Review

Assisted Ausgrid in developing a long-term pricing strategy that focuses on providing more cost-reflective prices to better signal the cost imposed by users on the network. The new pricing strategy was developed in light of (a) the availability and increasing deployment of interval metering and (b) the sale of the EnergyAustralia retail electricity and gas business with which the network business had formerly been associated. The work also involves developing a set of tariffs (both structure and price levels) that better reflect the revised pricing principles, and a transition plan that minimises price shocks in moving from the current to the new tariffs. It is expected that the new pricing principles and associated tariffs will provide significantly more cost-reflective prices, improved price signals for demand response, and greater certainty of recovery of required revenue.

Load Forecast for Regulatory Tariff Determination – EnergyAustralia and Integral Energy

In separate assignments, critically reviewed the load forecasting approaches and documentation being used by EnergyAustralia and Integral Energy to support the tariff proposals in their submissions to the 2009 Regulatory Network Pricing Determination process. This included expert advice on and modelling of the relationship between their energy and demand forecasts and pricing options.

Load Forecast for Regulatory Revenue Determination – ElectraNet

Currently assisting ElectraNet revise the approach it is using in its Regulatory Revenue Proposal to the AER. The assignment includes review and recommendations regarding all aspects of the load forecast, with special attention being paid to the impact of price elasticity as expressed in behavioural change and the take-up of energy efficiency and demand management measures and embedded generation, particularly from renewable energy sources.

Distribution Pricing Advice – EnergyAustralia and Integral Energy (separate projects)

Advised both Integral Energy and EnergyAustralia in NSW on the development of their pricing strategies and methodologies for their current access undertaking negotiations with the AER. This included expert advice on (a) the development of new time-of-use and dynamic pricing options and (b) the design and analysis of the pricing trials that are being undertaken by both distribution entities using a range of more dynamic, interval-metered pricing options at the residential level. The impact of these tariffs on network capex requirements and system reliability was also assessed.

Regulatory Strategy and Capability Development – Ergon Energy

Played a major role in an assignment to assist Ergon Energy, which at the time was an electricity distribution/retail utility owned by the Queensland (Australia) Government, develop the capabilities and databases required to meet regulatory requirements and develop and pursue a regulatory strategy. The assignment includes the following activities:

- Assistance to Ergon Energy in assessing the requirements of the Queensland regulatory framework and its implications and for Ergon Energy;
- Investigation of the impacts of alternative pricing options available under Queensland's existing price control regime on the economic and financial viability of the company, the economic development of the region it serves, and the net disposable income of residential customers, including equity effects;
- Assessment of how different economic forms of regulation and price control might provide increased flexibility and better outcomes for Ergon and its customers;
- Development of a high-level modelling capability to allow Ergon Energy to test the impact of changes in the economic form of regulation, pricing zones, asset allocation, and customer classes on the economic and financial viability of the company, and on the distribution of cost recovery responsibility on different customer classes;
- Development of a revised tariff plan that will send more accurate (i.e., cost-reflective) price signals to and more equitably recover utility costs from the various classes of the customer base, with particular attention to the reduction of existing cross-subsidies between urban and rural customers; and
- Development of a strategy to enable Ergon Energy to present and document its case regarding the preferred form of economic regulation and associated pricing strategy to the regulator.

Retail Pricing Issues

Trends in Residential Retail Electricity Prices – Electricity Supply Association Australia

Led a project investigating the trends in residential electricity prices in the five years to 2011. The specific aims of the project were to:

- track residential electricity prices over the last five years in major Australian capital cities;
- understand trends in the cost components of residential electricity prices and their contribution to total prices;
- estimate the impact of government climate change and energy efficiency policies on the price of electricity for residential consumers;
- understand changes in average levels of residential electricity consumption;
- understand the relative impact of price and quantity effects on increases in the average household electricity bill; and
- compare regulated retail prices with the best available market offer.

Notified Prices – Queensland Competition Authority

Led the consulting team that advised the Queensland Competition Authority on the setting of notified prices (standard tariffs) that pertain to domestic and small residential customers who have not taken a market contract offer for the first three years following the commencement of FRC in Queensland (2007/08 through 2009/10).

The methodology mandated by the Queensland government required consideration of all components of the retail cost stack including LRMC of generation costs, estimation of electricity contract/hedging costs and settlements, all relevant market fees and costs, network charges (as a pass through), retail operating costs and net margin, and the costs of meeting government policy obligations.

Retail Gross and Net Margins – Ergon Energy (Retail)

Led an assignment for Ergon Energy (Retail) that reviewed the methodology and model then being used by the Queensland government for setting retail electricity gross margins and assisted Ergon Energy in refining and documenting its views on what constituted the most appropriate structure, definitions and drivers of costs, and methods for quantifying each specific cost in order to calculate the gross margin to be included in franchise electricity tariffs.

In a parallel assignment, assisted Ergon Energy (Retail) in developing and providing a rationale for an appropriate net margin to be used in the development of retail tariffs for the residential customers it served.

Cost to Serve and Profitability – Ergon Energy (Retail)

Led a project that developed a model to enable Ergon Energy (Retail) to assess cost to serve and profitability on a segmented basis. The model provided the capability to track and project gross and net margin associated with: (a) commodity sales at a customer segment level defined within geographical regions and consumption bands; and (b) other retail product and services.

Retail Cost Review – Synergy Energy

Led a project team in assisting Synergy Energy in preparing submissions and responses to the WA Office of Energy's *Electricity Retail Market Review*. This included development of the costs incurred by the retailer in serving franchise customers on a cost component basis.

Wholesale Electricity Price Discovery – Synergy Energy

Served a member of the project team that identified and discussed price discovery mechanisms that might be applicable to and assist in improving the efficiency and performance of the WA Wholesale Electricity Market (WEM).

Effectiveness of Retail Competition in Victoria – Australian Energy Market Commission

Led an assignment that was part of the Australian Energy Market Commission's (AEMC) assessment of the effectiveness of retail competition in the small end of the Victorian electricity market. This assignment considered the full range of costs incurred by the Victorian retailers, by cost component, and the prices charged under the Victorian standard offers and market offers. From these, revenues and net margins were calculated for the standard offers and market contracts, and compared. Based in part on the results of this study, the AEMC found that competition had become effective at the small end of the retail electricity market in Victoria and recommended that retail cost regulation be discontinued. This recommendation was accepted by the Victorian Government.

Standard Tariffs – Victoria Department of Natural Resources and Environment (now Department of Primary Industry)

Led work for the Victorian Government in setting standard tariffs for the 2001/03 and 2002/03 tariff years, and for the 2003/04 through 2006/07 tariff years. In both cases, analysis of the components of cost incurred by electricity retailers was undertaken, along with consideration of an appropriate net margin. The 2003/04 through 2006/07 study also set trigger thresholds for the reconsidering the recommended tariffs, based on the amount of variance observed in key cost components (namely, wholesale energy costs and network costs).

Special Power Payments – Victoria Department of Natural Resources and Environment (now Department of Primary Industry)

The first set of standard tariffs proposed by electricity retailers in Victoria for residential and small business customers entailed significantly different increases for urban and rural customers. Lance led an assignment for then Victoria Department of Natural Resources and Environment (now Department of Primary Industry) that sought to balance the twin goals of (a) mitigating the economic and social impacts of steep electricity price increases in rural areas of the state, and (b) protecting the financial viability of the electricity companies serving those areas. The solution devised by Lance and the project team involved a transitional means for mitigating the impact of first year price increases in rural areas by providing a declining fund of Special Power Payments (drawn from general tax revenues) for rural customers.

Standard Offers – South Australia Independent Industry Regulator (now Essential Services Commission South Australia)

Served as a member of the project team that reviewed the costs incurred and revenue received by AGL in serving residential customers in South Australia in 2001/02 and 2002/03 to provide input to the development of standard offers for those customers in the following years.

Retail Electricity Operating Costs and Net Margin – Essential Services Commission

Assisted the Essential Services Commission (the independent regulator of the electricity industry in Victoria, Australia) in setting the first set of standard tariffs following the opening of the residential and small business customer classes to competition. The work involved researching and providing recommendations for the development of benchmarks for the operating costs and net margins to be associated with the standard tariff in Victoria.

Restructure of the Uniform Tariff

For the retail arm of Ergon Energy, led an effort to investigate how several of the state's Uniform Tariffs could be re-structured to make them more cost-reflective. Design criteria included the incorporation of a one year adjustment for inflation, ascending block structure, fixed monthly charges, a cap on the maximum rise allowed for particular types of customers, and revenue neutrality at the tariff level.

A spreadsheet model was built to assess the feasibility of different solutions for these design criteria, and a specific set of tariff prices and structures were proposed to the Queensland Treasury.

Review of Pricing Trial Impacts

Reviewed the results of several pricing trials that EnergyAustralia had undertaken based on the capabilities of smart meters they had installed to determine what level of pricing response the tariffs had engendered, the extent to which those impacts were statistically valid, and how they could be used in the company's demand and load forecasting on both a spatial and a system level. Pricing approaches that had been implemented and were therefore studied included an inclined block tariff (the company's default tariff), a seasonal time-of-use tariff, and a critical peak price tariff.

Innovative Electricity Pricing Seminar

Was one of the primary organisers of the first seminar to present the results of innovative pricing trials based on the capabilities provided by AMI. The seminar was presented in 2005 and featured case studies of pricing trials that had been undertaken in Australia, the US and New Zealand.

Customer Acceptance of Time of Use Tariffs

Conducted several studies for US utilities in the mid to late 1980s exploring customer acceptance issues related to time of use tariffs. He also assisted the Electricity Planning Office of Thailand in developing a set of marketing materials to promote the introduction of time of use tariffs.

Deregulation and Innovative Re-Regulation

Effectiveness of Retail Electricity Competition

Assisted the AEMC in assessing the effectiveness of competition in Victoria's retail electricity market.

Development of a Roadmap for the WA IMO

Participated in brainstorming the critical and strategic issues facing the IMO in considering the further evolution of the WA electricity market. Two models were considered: a fully competitive, decentralised market model and a more regulated model that included competitive features that were appropriate to and feasible in the WA context.

WA Electricity Industry Review

Led a team of consultants that assisted Synergy in responding to the WA Office of Energy's 2007-08 Electricity Industry Review, the objective of which was to further introduce competition and market efficiencies in the State's electricity sector, and which:

- reviewed the existing electricity retail tariff arrangements for their ability to meet longer-term market objectives;

- considered the timing and practical issues associated with the introduction of electricity full retail contestability (FRC) in WA; and
- considered the benefits and costs and applicability of the roll out of smart meters in light of the MCE work that had considered the same topics in regard to a national roll-out.

Assessment of Customer Experience in a Deregulated Electricity Market

In a series of three syndicated studies, directed the in-depth examination of customer needs, expectations and decision-making processes, and explored the experiences of customers in all contestable electricity tranches in Victoria and New South Wales. Specific topics of the study included present contracting arrangements, decision-making processes, contract offers (including pricing arrangements and options), the bidding process and future plans.

Full Retail Contestability

Implementation of Full Retail Contestability

Assisted the Energy Market Authority of Singapore in the design and implementation planning of all aspects of the introduction of full retail contestability.

Consideration of Full Retail Contestability

Provided advice to the Queensland government regarding the implementation of full retail contestability. Assisted in setting up a detailed program structure, delivering a term of reference, and providing policy advice and guidance to the Steering Committee and a set of three Working Groups, the establishment of which formed an important part of the project delivery strategy. Also assisted working group members in the development of a paper on alternative profiling options for customer electricity consumption measurement and calculation for the mass market.

Contestability for Residential and Other Low Use Electricity Customers

Directed a project for the Independent Pricing and Regulatory Tribunal of New South Wales that investigated a range of issues concerning metering and settlement in the contestable domestic market. These included:

- Metering versus load profiling;
- Market design issues and costs;
- Customer inertia and incumbent advantage;
- Social and regulatory issues; and
- Costs and benefits of competition.

The report was used as an input to a stakeholder seminar run by IPART, and received a significant amount of attention and support from the electricity retailers.

Metering and Settlement Issues for the Mass Market

Assisted Energex in investigating the relative advantages and disadvantages that different metering and settlement systems presented to the organisation. An alternative that had not been developed or investigated previously was identified as having potential merit, and Energex subsequently presented this approach to the relevant ESAA group for consideration. The approach involved dynamic sampling of second tier retail customers, and offered many advantages compared to other approaches that were then current in the market.

Review of Industry Restructuring and Competition in the Electricity Market in Australia and New Zealand

Directed a project for a large overseas electric utility which (a) reviewed the existing structure of the electricity industry in both Australia and New Zealand and then (b) conducted a comprehensive update of the current market reforms in those countries. This project covered the rationale for the competitive reforms, separation of the transmission grid, proposals for structure and operations of the market at both the wholesale and retail levels, the process planned for the transition to a competitive market, and the role and scope of regulation in the market. Additional detail was included on issues ranging from network pricing to trading of energy and contracts.