JIM SNOW
EXECUTIVE DIRECTOR

Adjunct Professor, University of Qld Energy Initiative

Bachelor of Engineering (Chemical) Honours, FIChemE

Graduate, Australian Administrative Staff College, Mt Eliza, Melbourne

Member of Australian Institute of Company Directors

PRIOR PROFESSIONAL HISTORY

2016 -	Adjunct Professor, University of Qld, Energy Initiative
2008 -	Executive Director, Oakley Greenwood
2006 - 2008	Senior Advisor, Charles River Associates - International
2005 - 2006	Energy Developments Ltd, Executive GM Development
2001 - 2004	Charles River Associates, Asia Pacific/Vice President
1993 - 2001	Energetics, CEO Consulting/CFO/General Manager
1991 - 1992	Hunter Electricity (Newcastle), CEO
1990 - 1991	Energetics Pty Ltd (Newcastle), Marketing Director
1978 - 1990	AGL, Manager Sales and Marketing (1986-90) / Manager Regulation 1990/ Manager Commercial and Industrial Sales (1983-86) / Project Engineer (1980-83) / Works Engineer (1978-80)

OVERVIEW

- Expert Witness primarily in gas matters and energy use - Mediation, Arbitration, Court Litigation and Regulator Compliance matters – GSA and GTA specialist.
- Extensive expertise in Renewable Gases and Natural Gas – underlying economics, technology options, transmission/distribution and storage, new developments, project modelling, synthetic methanation, biogases, hydrogen (and hydrogen blends).
- Decarbonisation across the mining sector and of major industrial energy use - including electrification, renewable gases and zero emission liquid fuels.
- Due diligence, risk management services on acquisitions and mergers.
- Energy Policy – assisting in developing, modelling, and implementing energy policy as we move toward net zero emissions in the energy sector.
- A range of key CEO, EGM and GM roles in various energy related businesses and practices, and several Board Directorships in Australia and in Asia. Preparation of numerous Board submissions and investment proposals.
- Extensive regulatory work and detailed economic analysis, and leadership of teams of regulatory economists and specialists – gas, water and electricity transmission and distribution networks.
- Project development activities and the management of major construction for electricity networks, gas pipelines, gas and solar power stations, CNG and LNG facilities.

- Design and review of electricity and gas markets in Australia and Internationally including Saudi Arabia and Malaysian Electricity Supply Industry restructures.
- Market entry and restructuring strategies and projects for leading Australian and International Retail business entities – including designing such entities.
- Consulting and development experience with demand side management, embeded generation (large and small scale), AMI and smart grid deployment.
- Energy efficiency and greenhouse gas mitigation for large energy users
- Operational experience in commercial, financial and regulatory modelling;
- Operational experience with contract negotiation, formation and management (extensively trained in this area);
- Jim develops and presents many professional papers each year on various regulatory and industry matters – current papers can be found on the Oakley Greenwood website www.oakleygreenwood.com.au

EDUCATION

- Adjunct Professor, University of Queensland Energy Initiative
- B.E. (Chemical) Honours, Fellow IChemE, past Fellow IEAust
- Graduate Australian Administrative Staff College, Mt Eliza, Melbourne
- Member Australian Institute of Company Directors

RELEVANT EXPERIENCE

Jim has recently led, designed, and implemented extensive (and often very sensitive and complex) renewable gas and energy projects for groups such as the Commonwealth Department of Industry, Science, Energy and Resources (DISER), Water Authorities (Yarra Valley Water, BAWB), the Energy Network Association, Victorian Department of Environment, Land, Water and Planning, Tasmanian State Development Department and the New Zealand Gas network Businesses.

Jim also led the development of stretch goals for the Low Emissions Technology Statement (LETS) working with the LETS Taskforce (Finkel, Clarke and King). This work was also peer reviewed by the CSIRO, ARENA and the CEFC. The focus of this work was on energy storage and the role of renewable gases (hydrogen and renewable methane).

Jim is also engaged with extensive developments related to hydrogen markets and how hydrogen technology can be monetised, including as dispatchable (demand side) load, liquid fuel replacement and through methanation. Jim has assisted several State Governments and the Commonwealth Government on renewable gas policy matters. Jim has also presented extensive workshops and papers on hydrogen and renewable methane technology, developments, and economics (latest papers are on our website). Jim and his team are spearheading the development of the economics of renewable methane options, and this is looking extremely promising.

Jim also led the strategic study into the energy needs of North Queensland for DISER (not published) and this included extensive (bespoke) modelling of the role and economics of either using or incentivising the use of load to soak up solar generation in the daytime (e.g., by tariff changes). The results were not intuitive, and dispatchable load options included things like hydrogen and renewable methane production, irrigation and aspect of industrial load shifting (which would also green these loads).

Jim has been a lead Expert Witness in the last two years in a $900m gas industry litigation, a $500m gas price arbitration, a Regulatory Action against a gas fired power station in the Federal Court, and for the Public Inquiry into the Western Outer Ring Main (WORM) Gas Pipeline Project focusing on energy policy issues associated with net zero emission targets and the role of gas infrastructure.

More generally, Jim has spent over 25 years consulting to water and energy companies in Australia, South East Asia, the Middle East and the US. He has extensive expertise in regulatory matters (particularly networks), modelling and pricing of embedded generation options and large-scale generation developments; energy efficiency, business restructuring and improvement; greenhouse emission matters and demand side management, water; government policy on energy and water matters; business development, market entry, business cases and plans and energy marketing; project development and implementation; gas, LNG and CNG; training.

Jim spent 12 years in the Natural Gas Industry (AGL) holding several senior executive positions involved with the technical end use of energy, regulations and tariffs, contract pricing, wholesale gas procurement, analysis of energy projects investment for Board submission, growth strategies – including developing and implementing mergers and acquisitions and extensive retail management.

Jim has also spent over 20 years consulting to large industrial energy consumers on their energy needs, energy efficiency and greenhouse gas mitigation issues, and to the leading energy and water companies in Australia, New Zealand, South East Asia and the Middle East. Jim was a leading executive in Energetics for 11 years and was CEO Consulting for more than 6 years, as well as an Executive Director.

Jim Snow has undertaken several major electricity industry restructuring and regulatory assignments as the lead consultant that have involved extensive analysis of power supply options - recently in Malaysia (MYPower, TNB and SESB) and the Kingdom of Saudi Arabia (SEC – 2.5 years restructuring the entire electricity supply industry).

Jim is regarded as a leading expert in the gas sector in terms of gas supply options, transmission, distribution, pricing, contracts and end use. Jim has over the last 10 years developed gas supply options for a number of power station developments (on and off grid) including piped gas, LNG and CNG supplies. He has also built gas transmission and distribution systems and small-scale LNG and CNG facilities.

Jim also has Senior Executive experience running a major Business Development and Construction business for listed entity Energy Developments Ltd (Executive General Manager reporting to the Managing Director). This encompassed (Coal Seam Gas, CNG and LNG) power station developments – remote and embedded, production and trading of greenhouse gas credits and certificates, and CNG and LNG facility developments in Australia. Jim developed detailed financial models for all the investment opportunities for EDL over a 2-year period and reported these to the Board at each Board meeting. He was responsible for these developments and if approved their construction and commissioning.

Jim has also been the CEO of a major electrical power systems contracting company specializing in the design and construction of sub-transmission (132 kV) and low voltage overhead powerlines and electrical contracting.

He also has extensive project development and implementation experience (including construction management), is engaged often to undertake bespoke modelling and pricing assignments; retail new entrant strategies and implementation, business restructuring and improvement; greenhouse emissions matters and demand side management.

Jim's expertise and standing in the energy sector was recognised in June 2016 being conferred the Honorary Title of Adjunct Professor by the University of Queensland, Energy initiative.

REPRESENTATIVE ASSIGNMENTS AS LEAD CONSULTANT

Jim has been closely involved in both gas industry and power generation investments, sector decarbonisation and market analysis

- Led the development of a critical report for the Commonwealth Department of Industry, Science, Energy and Resources DISER on Long Term Gas Investment in the Australian economy. This report was to assist the National Gas Infrastructure Plan. It was a desktop study and modelling considering the evolution of the gas market between 2022 and 2040 and out to 2050, and how this market would integrate with the developing renewable electricity supply as it starts to dominate, as well as Government policy implications (Sate and Commonwealth). Jim led this study and modelling, (5 scenarios were modelled) and it looked extensively at the scenarios that are likely to develop and their implications on supply and demand for gas and renewable electricity generation. The report also focused on the development of renewable gases – hydrogen, biomethane and synthetic methane and the role they could play in reaching net zero emissions.
- Led a major study for the Victorian Department of Environment, Land, Water and Planning looking at Options for Increasing the Use of Renewable Gases (hydrogen, biomethane and synthetic methane). As the Victorian Government policy to move the state toward a net zero emissions outcome progresses it was imperative to examine the options for increasing the use of renewable gases in the sector and the role they can play in terms of sector coupling with renewable electricity generation and end use. This report informed the Victorian Gas Substitution Roadmap Consultation Paper.
- Jim also assisted the NSW Department of Planning, Industry and Environment consider the options for a Renewable Gas Certificate Scheme in association with Deloitte.
    - This is one of several projects Jim has led recently that have developed renewable gas certificate schemes for NSW, Victoria and nationally - for groups such as the Energy Networks Association, the Australian Hydrogen Council and Australian Hydrogen Centre.
- Led the development of a Response to the New Zealand Climate Change Commission's Advice related to decarbonisation of the gas sector in New Zealand on behalf of the three major NZ Gas Network Businesses (Vector, Powerco and Firstgas).
    - This related to the New Zealand Climate Change Commission's draft advice on how New Zealand can reduce carbon emissions over the next 15 years (2020-2035) in a way that is consistent with New Zealand's legislated target of net zero emissions by 2050.
    - This report significantly impacted the final advice that was issued, specifically removing some recommendations for mandatory changes. It also addressed the use of renewable gases that was not well understood at the time.

- Led a crucial review of the strategic energy requirements for North and Central Queensland for the Department of Environment and Energy (Canberra). This work involves detailed analysis of the commercial and industrial demand now and into the near future and what level of synchronous generation or system support is required, integration issue and what will this cost, and other policy or regulatory options should be considered. This project also involves an extensive stakeholder engagement process with some 40 direct interviews being undertaken. OGW has a team of 6 working on this project.
- Jim was engaged in a major litigation over the purchase of a large gas asset in Australia as an Expert Witness. This work related to the development of expert gas market materials and analysis, and gas contract development and risk mitigation. Jim was supported in this task by 3 staff undertaking modelling and research activities.
- Jim was also engaged as a gas market expert on a Gas Supply Agreement Gas price reset arbitration (in front of one of Australia's leading ex-judges), involving a major gas producer and one of the large gas Retailers. This involved subpoenaing every major gas supply and transmission agreement on the east coast of Australia for expert review (some 40 plus contracts). This was a landmark Arbitration as Jim's testimony was fully accepted by the Arbitrator as to the methodology for setting forward gas prices under Australian gas market conditions (where supply and demand dominate, not LNG netback equivalence as many believe including the opposing international experts). This led to another major gas price arbitration to be settled using this methodology.
- Jim has been engaged by the Australian Government Solicitor who have been instructed to act for the Australian Energy Regulator (AER) in a matter involving a major Power Station owner in South Australia where the AER is alleging breaches of the National Electricity Rules. Jim is the Expert Witness regarding the critical issue of gas supply to this Power Station.
- Jim is currently engaged by lawyers to provide expert advice on a mediation matter for a major development in Sydney related to embedded networks and associated generation (electricity, heat, coolth). This has involved modelling and strategic thermal supply contractual advice and is likely to go to mediation or arbitration.
- Jim has also recently led studies into:
  - Hydrogen production for a major water facility in Victoria – where the use of oxygen is providing a significant economic advantage. This work has also focused on the end markets for hydrogen in great detail and the results are extremely interesting (and not at all intuitive).
  - The development of technology stretch targets as part of the Commonwealth Technology Investment Road map.
  - Assisting a water authority to move toward zero emissions – moving large pumping loads onto zero emission energy systems.
  - Into a detailed review of the Regulatory hurdles for Hydrogen production and distribution for the pipeline industry, as well as potential subsidy schemes for early development.
- Jim led the Gas Shippers Survey 2019 - for DoEE, OGW designed and conducted a stakeholder survey to seek information and views from gas shippers on the information disclosure and arbitration framework for non-scheme pipelines (Part 23 of the National Gas Rules) and on the framework for scheme-pipelines (Parts 8-12 of the National Gas Rules).

- Jim led the Gas Bulletin Board Scoping Study 2018/19, AEMO on behalf of the Commonwealth Government Minister for the Environment and Energy – this project examined in major detail the options for improving the data and information on the GBB from Producers and Pipeline operators with a focus on real time provision of data and information to increase market transparency, and included extensive stakeholder interaction, assessment of regulatory impacts, economic policy analysis and a full cost benefit analysis of the key options. It covered both the east and west coast GBB's.
- Expert Advice – Capacity Trading Reform Package 2017/2018 and 2018/2019 - for the Gas Market Reform Group (GMRG). This was a lengthy engagement to provide expert advice on the capacity trading platform and the day ahead auction. This includes recommendations on the principles for development of zones for pipeline capacity trading, review of legal drafting of amendments to the National Gas Rules and extensive stakeholder engagement with pipeline operators and producers to provide advice to the GMRG on the potential that allocation arrangements have to impede pipeline capacity trading,
- Economic and Commercial Advisory – Gas to Market Project 2019, Queensland Department of State Development, Manufacturing, Infrastructure and Planning – much of this report remains confidential, but it examined the issue of gas pricing in the State and east coast and related policy options and decisions.
- Gas Price Trends Review Report 2017/2018 - for the Dept of Environment and Energy. This report was an update to the original (2015) report completed by OGW and was commissioned by the GMPIT, COAG Energy Council. The reports examined in detail (jurisdictional, segment, supply chain) the price trends in gas in Australia from Producers through to Retail, for large and small consumers over the last 10 to 12 years and is now a major reference report for the industry and Government.
- Gas Transmission Arbitration 2018 – Snow provided expert testimony and opinion through papers and reports, and reviewed submitted expert reports, on behalf of Hydro Tasmania when it sought access to the Tasmanian Gas Pipeline on reasonable terms (that reflect workable competition) through a form of enforced commercial arbitration undertaken under Part 23 of the National Gas Rules.
- Snow was also the gas expert engaged to advise the Tasmanian Energy Security Taskforce in late 2016 and provided extensive advice on complex matters related to gas supply, use and energy security for Tasmania to the Chairman.
- Extensive gas market review for a large offshore (Japanese) investor 2018 – the OGW gas team, led by Snow, completed a very extensive market review of the gas markets in Australia for a Japanese company that has major investments in LNG facilities in Australia and internationally and wanted to understand the Australian market and related investment opportunities in more detail. This work also involved extensive forecast modelling examining the likely interaction of gas and power wholesale markets under current State and Commonwealth emission and renewable generation policy trajectories to 2040. It was landmark work for a major investor and was delivered at Board level in Japan.
- LNG use in Papua New Guinea 2018 – OGW gas team led by Snow is undertaking a major assignment for an international mining company related to the potential for them to use LNG for powering their major mining works in PNG. This assignment includes analysis of the price of internationally traded fuels, including LNG, and involves engaging with international LNG traders and producers.

- Gas Power Stations for Miners – the OGW gas team has completed several major gas repowering projects for major miners in Australia and continues to undertake such work e.g. South32, Tronox, Oz Minerals, Chinova Resources, Cristal Mining, Glencore, Newcrest, Anglo Gold Ashanti, Rio Tinto, Adani – this work also involves placing a commercial value on gas reserves, and extensive integration of solar and energy storage. Jim has also completed major power station prefeasibility assessments and implementation of new plant for miners.
- BMA (Coal) – Decarbonisation of Major Coal Mining Operations - This work primarily examined the electrification of a major coal mining operation in Queensland (across 9 mine sites) using zero emissions electricity and the relative impacts on electricity networks and generation/supply requirements. It is landmark work and demonstrated the enormous impact mining electrification would have on the energy supply systems. This work has also fed into the electricity system planning currently being undertaken in Queensland.
- Interview with Seoul Economic Daily on LNG and Gas Markets in Australia – OGW was approached by Kogas the Korean state-owned gas supplier – one of the biggest buyers of LNG in the world with investments in LNG production internationally – for Adjunct Professor Snow to be interviewed by this leading Korean newspaper as a recognised Australian expert on gas markets and regulatory issues (and gas related investments) in Australia.
- Jim over the last 10 years has had long term engagements with major gas power station developers (all have existing stations – in total projects were in excess of 2,000 MW) working as part of their project teams on modelling of the financial viability of the projects, providing detailed information to support funding, assisting with the strategic development of the project, and working extensively on gas supply agreements and power off taker arrangements and market price forecasting.
- Jim assisted HRL technologies during the development of their Dual Gas Power Station plant that used natural gas and the output from HRL Technology brown coal gasification plant. This project went to full development but was halted due to a drop-off in the NEM wholesale market prices – Jim provided modelling support and the procurement of gas supplies for the project for over 2 years.
- The gas supply arrangements for power stations (circa contract size exceeding $6 billion) have led Jim to develop a 20-year gas price forecast that has been used by these investors and is based on a high degree of price discovery across gas, coal and LNG markets in Australia and Asia. This is matched with Oakley Greenwoods electricity price and demand forecasts using our proprietary models.
- Prior to this Jim was a lead advisor to two small companies that we seeking to develop into the embedded gas fired power generation and renewable energy power generation sectors.
- Jim worked for two years with Energy Developments Ltd as their lead business development Executive General Manager (EGM) reporting to the MD and regularly reporting to the Board on development matters, opportunities, and projects. This included major power station developments and potential merger and acquisitions.
  - While at EDL Jim developed a detailed financial modelling approach to project investment analysis and embedded a process of MD and Finance Director sign off prior to Board sign off based on this modelling approach. Jim also was responsible for the construction and commissioning of all major projects once they were signed off by the Board and their on-going economics on completion. He then handed them over to the Operations side of the business.
  - As part of his Executive role Jim also worked closely with the Auditors of the business to verify and have signed off the holding values of the various on-going assets and facilities (mostly power stations), and the work in process, for the annual accounts.

- Jim also pitched the development of an LNG peaking and fuelling plant at Newcastle, NSW to AGL while at EDL. AGL subsequently went on to develop this plant after Jim left EDL (A$310m).

- Acted for a major Queensland industry on the potential purchase of 20 PJ of gas from either Timor Sea or PNG for self-generation.
- Examined the role of gas-fired generation in Australia and the subsequent opportunities that arise in the market for new developments and market entry.
- Led a major market review of renewable energy and gas fired electricity generation of the Asia Pacific region for a major US Utility with detailed work on the opportunities in China.

Economic Regulation, Demand Side Participation and Pricing for the gas, electricity and water industries, and Embedded Network Development

- Jim was engaged to give independent Expert Witness testimony to the Victorian Western Outer Ring Main (WORM) Public Inquiry. This was focused on the role for gas, renewable gases and gas infrastructure as the State of Victoria looked to transition to a net zero energy sector. The report was public, and Jim was publicly cross examined on this work and it highlighted the role both renewable gases and gas infrastructure can and will likely play in this transition. It also highlighted the enormity of the task commercially and presented new material and modelling on the sector coupling of gas and electricity, and likely timing concerns. It specifically highlighted the transitional value of gas infrastructure.
- Jim also led an independent report developed for APA Group on the likely supply and demand scenarios for gas use in Victoria and the Australian east coast for submission as part of the Australian Energy Regulators review of the Access Arrangements 2023-27 for the APA Victorian Transmission System. The Report and associated presentations have been circulated extensively to interested customers and parties.
- Jim advised Murrumbidgee Irrigation on the development and implementation of new pricing structured and tariffs. Initial advice was received by the Board and was implemented.
- Jim led a team in Malaysia for over 5 years to assist in the development of their economic regulation – he has worked for the market reform team, Tenaga Nationale and Sabah Electricity.
- Jim advised a large retirement park operator on the economics of embedded electricity networks with solar generation and battery storage, and in regard to the new Embedded Network Operator rules.
- He also advised the AEMC on embedded networks in a landmark report including specific case studies.
- Advised Ausgrid on various electricity pricing issues related to time of use, demand response and pricing strategy including assessing pricing options and peak demand reduction incentive scheme options for their management and Board, for submission to national and jurisdictional regulators (AER, IPART) and other stakeholders.
- Jim completed the development of a pricing and cost allocation model for CBD electricity network owner Energex (Brisbane, Queensland) that is more flexible, provides more analysis tools, and is more attuned to the new National Electricity Rules and Regulatory procedures – this was a major modelling project led by Snow and has been used extensively for network regulatory determination modelling.

- Jim led detailed work with both Ausgrid and Endeavour Energy on the development and verification of their underlying peak demand and energy forecasts and how these relate to pricing and regulatory issues, as well as supplied a number of submission documents for their Regulatory (AER) reviews.
- Jim provided the outlines for the electricity dynamic pricing trials work undertaken by Ausgrid and Endeavour Energy in NSW and has undertaken detailed reviews of these trials, and provided analysis and advice on progressing this work.
  - Jim has worked closely over many years with the authors and implementers of the landmark dynamic pricing trials work undertaken in California (particularly Dr Ahmed Faruqui) and has presented joint papers and peer reviewed work in this area.
  - Jim worked extensively with Southpower (now Orion Energy) in Christchurch on the development and implementation of their network dynamic pricing products. This was ground breaking work internationally (completed in 1993/95) and it has seen the total reversal in the network system load factor trends. This was diminishing quickly and over a 20-year peak demand has grown less than 10% whilst energy consumption has been very strong lifting load factors back to very high levels.
  - Jim also provided Southpower with the underlying marginal cost analysis and benchmarks that have been consistently used over that 20-year period to analyse network investments and demand reduction strategies (particularly embedded generation which has been taken up extensively), and set prices (still used today).
  - Jim developed a key paper for Integral (Endeavour) Energy on the impacts of air conditioning on their network and estimates of inherent subsidies and deadweight loss, as part of the IPART Determination of Revenues for DNSP's in NSW for 2004. The paper (Integral Energy – CRA Air Conditioning Impact Report – publicly available) has been recognised nationally and internationally as a benchmark on this rapidly developing issue.

Renewable Generation, CNG, LNG and Remote Power Station developments in Australia.

- Jim has recently completed a review of the costs of renewable Hydrogen, the capability for injecting Hydrogen into networks and the development of subsidy schemes to support the development of Hydrogen.
- Jim has recently assisted with major energy supply studies for OGW's many mining clients (Tronox, South 32, BMA, etc.). This work has been pioneering the integration of renewable generation – wind and solar PV – and battery technologies. Current projects are examining the ability to get to 85% to 90% plus renewable energy displacement. One project is lookig at a net zero emissions outcome for 9 very large mine sites.
- Jim advised a large solar PV power station developer on selling the offtake from their portfolio to large energy users (e.g., miners) using financial instruments and direct supply options. This corporate PPA work was/is ongoing with several other developers in 2018 and 2019.
- Jim has also advised several; new market entrants into the solar PV power station market in Australia (Chinese and German groups).
- Jim was instrumental in the development and construction of remote power stations fuelled off coal seam methane gas which receive major environmental (green) credits in Australia (e.g., German Creek plant).

- He also pioneered the long-distance trucking of CNG to fuel remote power stations (Yulara) and was heavily involved in the development of CNG and LNG supply, storage and dispensing facilities for transport and power use across Australia.
- Jim also led the development of LNG use for mine haul trucks (circa 200 tonne) with the options of using drainage gas at coal mines as the fuel (formed venture of CAT, Xstrata, EDL and Westport from Vancouver). This was while at EDL and was subsequently taken up by CAT and Westport after Jim left EDL.
- Jim has completed major power station prefeasibility assessments and implementation of new plant for Anglo Gold Ashanti ($300m plus) and South32, and similar assignments for Rach and Rio Tinto.
- Led a major market review of renewable energy and gas fired electricity generation of the Asia Pacific region for a major US Utility with detailed work on the opportunities in China.
- Jim also completed a detailed business case for a Chinese supplier of Solar PV power stations for market entry into Australia. This work included the detailed financial modelling of the various market sector opportunities and advice on entry strategies.

Water Sector

- Jim has been leading advice to Yarra Valley Water on the development and commercialisation of renewable gases at its largest waste-water treatment plant. This has included the purification and use of hydrogen from its anaerobic digester, methanation of the carbon dioxide from this digester, and modelling the economic and market access for these products. This work also examined the economics of using the resultant oxygen in the waste-water treatment process where it has significant value.
- Advised Murrumbidgee Irrigation on the development and implementation of new water pricing tariffs over a 12-month period.
- Advised South East Queensland Water (Seqwater) on new tariff options for bulk water.
- Advised IPART, the water regulator in NSW on the capex and opex costs of various water authority pricing and revenue submissions.
- Advised Unitywater on its first regulatory submission to the Queensland Competition Authority. Unitywater has recently been formed from the water and waste water assets of Moreton Bay and Sunshine Coast Councils and is both a network operator and retailer.
- Also advised Unitywater on the development of its field control strategies and internal resourcing.
- Advised the Queensland Department of Energy and Water on policy related to Independent Water Utilities and new entrant providers.
- Advised a very large investment fund on the due diligence for a major water related acquisition.
- Water and wastewater – Jim has undertaken several key studies of the value chain in the water industry, operations, pricing and management of inputs (Hunter Water, GCCC, and Brisbane Water).

Demand Side Energy Management, Energy Efficiency and Productivity, Procurement and Industrial Energy Use

- Jim worked closely with the large energy intensive industries to assist them to develop their strategies for increasing energy productivity and manage energy costs in a deregulated market (for electricity and gas). This included industries such as glass, bricks, aluminium, steel, plastics, pulp and paper, wall board, MDF board, chemicals (particularly fertiliser plants), food (particularly meat and chicken processing), beverage and beer, manufacturing, etc.
  - This also included managing greenhouse emission matters in some detail, and
  - He developed sophisticated strategic options for especially large users to become more of a participant in the industry using the strength of their portfolios (to the point some customers are also now energy traders with limited risk exposure).
- With his partners, they built a leading consulting business in Australia (Energetics) and as the CEO of Consulting (and Executive Director) he oversaw some 120 staff working on these matters across Australian and the South East Asian region. This included the development of a range of new and innovative technical options, process improvements, and other related products for large users including web-based data aggregation systems (and management/reporting modules) and separate tendering services for energy procurement – but the focus was always on developing and delivering effective strategies.
- He also forged strong links with some of the key energy providers in Australia and developed for them a range of service businesses and products they could offer to their large users and new procurement related joint services to minimise margins and optimise the value of the client's portfolio (e.g., demand management options, technical support services, trading options, greenhouse credit development options, bespoke supply arrangements that avoided key market risks, etc.).
- Jim has also advised some of the large energy intensive industries on strategies to exploit the greenhouse gas reduction and carbon tax/trading scheme developments - how to turn compliance into a business opportunity and to make it a competitive advantage of the business (including using CHP type arrangements).
- Jim has also been a lead advisor to GridX Power which was a trigeneration developer (9.6 MW Trigeneration plant for Qantas at Sydney Airport).
- Policy and modelling work for AEMC and NSW OEH related to energy efficiency measures and peak demand reduction options and impacts – this integrated the NEM price modelling forecast dynamically to assess the impacts of various policy options and required new and innovative modelling developments to be undertaken to get reliable results;
- Advised on advanced metrology developments (AMI metering) issues in Victoria – key work examining cost benefits of these technologies in the supply chain;
- Facilitation of major industry issue workshops and working groups for AEMO (previously for NEMMCO and VENCorp) and for the Energy Networks Association including a recent workshop on consumer issues related to AMI and price increases with 10 network owners, 10 retailer groups, 10 national and jurisdictional regulatory and policy groups and 10 consumer representative groups.
- Has advised on the barriers and opportunities for Demand Side Response and embedded generation involvement in the Australian energy market including recommendations on related policy issues for several state government bodies, independent entities, market participants and Regulators (numerous projects spanning 20 years).

- Wrote numerous submissions over an 18-month period to the NSW IPART review of the AGL Gas Undertaking (Revenue Determination process) for major energy users (CUB, NSW Health, CSR – public reports) and for a major competitor/new entrant gas Retailer (EnergyAustralia) that was highly successful in establishing large user pricing economics and assisting new market entry.

Jim has undertaken extensive work in the energy retail sector

- Undertaken several business strategy projects for very large retailers advising on the most efficient way to organise and implement customer service in retail operations and to develop new services and offerings in the market.
  - This has included detailed work over an 18-month period with the then EnergyAustralia Retail business (Sydney – 1.2m clients) to completely review and redesign their operational processes, business systems and sales strategy within the competitive energy market and developed a working financial model for the business based on a value creation process. The recommendations from this work were implemented and the business went from making large losses to full profitability, and became benchmarked as one of the lowest cost to serve retail businesses in Australia.
  - Strategic advice to a leading regional retailer (Ergon Energy – Queensland) on business development and stakeholder management over a 5-year period.
  - Jim also worked through (facilitated) with the Ergon Energy organisation the pricing strategy that was taken to the Regulator for both the network and retail components and for the treatment of Customer Service Obligations (cross subsidies) and capital contributions policies.
  - Jim worked on several projects for Integral Energy (when they were a Retailer) on key retail matters associated with their overall retail strategy, product developments and tariff development.
  - Jim worked extensively with Energex in the early days of the market opening in Queensland on strategy and product development, and
  - Jim advised on the setting of retail costs and margin benchmarks for the first Retail pricing regulatory review (in Victoria) and the options developed now form the basis for this type of regulation across the NEM.
- Development of several new gas businesses for electricity retailing groups in Australia and New Zealand – full business plans and follow on implementation work.
- Jim has extensive advisory experience with new entrants and start-ups in Australia (at Board and MD level) having been a key advisor to GridX Power and CBD Energy (ASX listed) in particular. He comprehensively assisted them to develop their on-going business strategies, modelled their financial forecasts and business scenarios and assisted with the implementation of their business plans (also assisted with regulatory matters, gas and power sourcing, marketing strategies and other key operational matters).
- Jim has recently advised a new solar PV start-up venture on the design and implementation of a new PPA based product including detailed modelling of consumer economics and forecasts of take up above business-as-usual – and has advised the Clean Energy Finance Corporation in this process regarding potential changes to consumer tariffs and their likely impact on PV take up.

Gas and Electricity Markets in Australia, Asia and the Middle East.

- Jim worked in Malaysia (peninsular and Sabah) on issues associated with the restructuring of their Electricity Supply Industry (TNB, SESB) and issues related to the development of the power generations sector.
- Jim was for example engaged as an expert advisor to the Malaysian Government working group (MYPower) on the potential governance and restructuring options for the Malaysian electricity supply industry – including the disaggregation options such as forming new Generation, Transmission, Distribution and Retailing entities.
- He was then engaged on a long-term contract to Tenaga National Berhad (TNB) the fully integrated power industry business for Malaysia working closely with their senior management on the restructuring issues, including the development of the power sector and its long-term viability including demerger options, the impacts of renewable energy programs, impacts of coal and gas/LNG pricing, etc.
- Jim led a detailed review of the TNB initial approach to IBR implementation and made some 45 recommendations for improvement for the second IBR review period, all of which were accepted and implemented,
  - Jim has also led the first IBR submission process by Sabah Electricity Berhad (SESB), particularly advising on regulatory strategy as this is a very heavily subsidised supply system.
- Advised on the NSW Solar Bonus Scheme including developing (and reporting) detailed supply and demand constraint modelling and forecasting and cost effectiveness analysis e.g. equivalent carbon abatement cost calculations;
- Jim was a key author of a top end review of the Victorian Gas Market (market carriage market design) for VENCorp and the local market Participants.
  - Jim has previously undertaken reviews for VENCorp of the gas market design, and modelling and valuation of LNG storage in Victoria including recommendations on the approach that should be taken for its economic use – model now in use in the gas market.
- Restructuring of the Saudi Arabia Electricity Company (SEC), which at the time had some 38,000 MW of generation plant servicing a country of some 20 million people, and had some 30,000 permanent staff. Jim was the strategic architect and lead industry adviser on the formation of the new generation, transmission, energy trading, distribution/retail and shared services businesses over a 3-year period (2002 – 2004):
  - The Transmission Business Unit (TBU) was designed to be the sole buyer in Saudi selling to the Distribution Company and to a small group of large users (55% of the sales). The structure of this entity featured the creation of two zones by Snow that covered the developing regions and a consolidated zone which pulled together interconnected sections of the transmission grid for greater efficiency. Snow created the initial specification of all roles (down to Level 4) in this Business Unit.
  - The Distribution and Customer Services/Retail Business Unit (Distco) which encompasses distribution and retail operations and sells power to the majority of small medium enterprises and residential users. Snow worked very closely with the then head of this Business Unit (now SEC MD) and designed the structure of the new business to manage multiple and competing requirements, and specified all jobs down to Level 4 in the organisation. Snow also developed the interaction with the newly created Regulator which involved detailed discussions on how this oversight should initially work in KSA.

- Generation Business Unit development. Snow gave extensive advice on the structuring of this unit and how it should develop more efficient dispatch operations under a workable model before any transition to a competitive market environment, and developed transfer pricing systems for cost transfer. This work also involved structuring the Business Unit to be able to disaggregate in the future (into competing units) if this was deemed to be warranted or to continue along the path of more efficient dispatch methodologies. Snow was directly involved in the design of the hierarchy and development of the job roles (again down to Level 4 in the organisation);
- Overall this work involved extensive input and leadership of the CRA organisational structure design team working directly with the senior SEC team, development of detailed business strategy and business plans for the new Business Units, development of the regulatory affairs group and its strategy in both Transco and Distco and future access arrangements, and advice to the SEC senior staff on the formation of JV's and third party investment in the industry including the development of desalination plants that deliver water and electricity.
- It also involved a detailed review of the operational benchmarks related to distribution, transmission and support services such as materials management and transportation. This review led to the development of a financial management model (led by Snow) and the setting of key performance metrics for these separate business undertakings (set by Snow).
- The project also involved the detailed analysis of more economically efficient pricing options in Saudi and how these could be implemented within the middle eastern culture and legal systems.

Technical Expertise

- Jim is a Fellow of the IChemE (past Fellow of IEAust) and was the Chairman of the IEAust College of Chemical Engineers for some 6 years after holding numerous positions on its Board, and sat on the Board of the IEAust for several years. He has represented Australian Chemical Engineering in the UK (Presented to Duke of Edinburgh), Hong Kong, Taiwan, New Zealand, Singapore and the US.
- Jim is one of the few Professional Engineers in Australia to have developed and constructed power stations, gas transmission and distribution systems, electricity transmission and distribution systems, and CNG and LNG facilities.
- Jim's expertise and standing in the energy sector was recognised in June 2016 being conferred the Honorary Title of Adjunct Professor by the University of Queensland, Energy Initiative.