ANGUS RICH
PRINCIPAL CONSULTANT

Bachelor of Engineering (Mech)
First Class Honours
Queensland University of Technology

Member of IEAust

PRIOR PROFESSIONAL HISTORY

2013 – present	Principal Consultant, Oakley Greenwood Pty Ltd
2012 – 2013	Senior Associate, Energy and Carbon, Balance Resources Pty Ltd
2010 – 2012	Business Development Manager, Energy Developments Pty Ltd
2008 – 2010	Principal Engineer, Parsons Brinckerhoff Pty Ltd
1993 – 2008	Various roles including Engineering Manager and Manager – Innovation and IP, Energy Developments Pty Ltd
1991 – 1992	Research Assistant, Queensland University of Technology
1987 – 1990	Cadet Engineer, Queensland Department of Works

OVERVIEW

While at OGW, Angus has applied his commercial and technical expertise to a range of embedded and demand side generation projects. These have included the financial and technical development of solar and battery storage price forecasting and load profile development. His resent work with the NSW Transgrid asset sale process saw him undertake demand load profile development for solar with/without battery storage, electric vehicle charge profiling, and energy efficiency policies. Other work has included network and NEM modelling for INSW to develop policy for net-zero emissions by 2050. The modelling included forecasting of technology options for both central and demand side deployment. He is currently working with RV Homebase on an embedded network feasibility study to determine the appropriate mix of solar PV generation and batteries to manage zero export and peak demand management.

Prior to joining OGW, Angus has worked with Parsons Brinckerhoff where he has undertaken financial and technical due diligence for Federal grant programs. He headed up the consortium (with ACIL Tasman, KPMG, Synergy) that undertook due diligence on the initial and secondary applications as part of the $2 billion-dollar CCS Flagship Program. He also undertook due diligence for the GCCSI for submissions for funding from global applicants.

Angus offers a wealth of technical expertise balanced with commercial experience within the resources and energy industry with a focus on the gas and power sectors. His expertise lies in project development and engineering management across a range of development and operating projects covering power generation, gas supply, gasification and mechanical services.

Angus has experience in business development for Energy Developments Limited. In this role he was responsible for early bidding and client engagement strategies to the formation and involvement of Power Purchase Agreements, Development Agreements, and EPC Agreements. He has extensive and ongoing experience with dealing with several consultants and equipment OEMs who operate in the remote and grid power spaces.

During his career, Angus has developed areas of expertise and core competences covering:

- Project and business development of technical opportunities in power generation and carbon abatement
- Due diligence advice and technical studies
- Financial and economic assessment of prospective projects
- Advice on Power Purchase Agreements, Connection Agreements and contract negotiations
- Commercial and in-depth technical expertise in power generation, gas and carbon projects
- Core knowledge of project development for energy solutions, alternative fuels and carbon abatement
- Core knowledge of capital and operating sensitivities for the short and long run costs of power delivery alternatives and respective carbon sensitivities

Angus has held senior roles with Parsons Brinckerhoff and Engineering Management positions with Energy Developments Limited.

RELEVANT EXPERIENCE

Due Diligence and Studies

- RV Homebase engaged Oakley Greenwood to help develop strategies for their electricity options for their senior lifestyle development which has an embedded network. The work involved modelling of several options including solar PV with storage and different tariff options using HOMER software. The results lead to pricing strategies and improved value options for RV Homebase.
- Review of Electranet's modelling as part of their RIT-T South Australian Energy Transformation process. The review examined the modelling input assumptions and PLEXOS results to identify any fatal flaws or improvements.
- Modelling of NEM central technologies for different scenarios to reach net zero emissions by 2050 using CEMOS. The modelling included technical and performance projections of renewable and low emission technologies, and impacts and changes in the operational demand and energy profiles including embedded technologies such as Solar PV and batteries. Project was for Infrastructure NSW.
- Modelling of embedded solar generation, electric vehicles and energy efficiency impacts on demand and energy 30 year forecasts for the sales process of the NSW Transgrid. The work also included electricity price forecasting using CEMOS and detailed modelling of potential wind development sites in NSW. Project was for IFM and QIC.
- Financial and technical modelling for the determination of the indicative value of prospective exploration areas for the Department of Resources and Mines Qld. The project involved the detailed probabilistic development of the resource, and infrastructure requirements and capital and operating costs to undertake the Equivalent Monetary Value (EMV) probabilistic analysis to determine the cash value of the potential reserve.

- Technical and commercial due diligence of the central thermal plant at the One Central Park mixed-use urban renewal project in Sydney. The central thermal plant consists of a tri-generation plant and centralised cooling and heating plant supplying residential, retail and commercial complexes.
- Technical and commercial due diligence into a virtual pipeline development for Macquarie Bank. The virtual pipeline was for the road transport of gas using CNG to an iron ore mine in the Pilbara region of WA.
- Project managed the feasibility study for Urban Utilities for generation opportunities from their digesters at Luggage Point operations.
- Team lead for the technical advisor consortium to the Federal Government for the CCS Flagship program. Advice and assessment of project submissions and representation to the Independent Assessment Panel.
- Technical Due Diligence Sale of Energy Developments, Global Assets, Archer Capital. Manager of team to review asset operation and provide advice to Archer Capital.
- Power Station Pre-feasibility Study for Ranger Expansion Project, Ranger Uranium Mine, Jabiru, Northern Territory, Rio Tinto. Selected and recommended required power station equipment.
- Technical Due Diligence Sale of Kalgoorlie Power Systems, Western Australia and Northern Territory, Commonwealth Bank. Independent derivation of cash-flow models for banks evaluation.
- Innamincka geothermal 500 MW Power Plant – Unit 1 Tender Design and Documentation, South Australia, Geodynamics. Project manager.
- Innamincka geothermal 1 MW Power Plant Engineering, Procurement and Construction Management (EPCM), South Australia, Geodynamics. Project manager.
- Queensland Coal and Gas Power Generation Siting Study, International Power. Lead engineer on study.

Remote Power and Waste Coal Mine Methane Projects

- Cannington Mine Island Gas Power Station Power Re-Contracting, Qld, South 32. Worked with the procurement team to develop a contracting strategy for the 40MW power station for the mine extension. The assignment involved early conceptual financial studies, tendering strategy, and final negotiations and PPA development. It also included a new solar PV system integrated into the natural gas power station.
- Kestral Coal Mine, Qld, Rio Tinto. Engaged by Rio Tinto to undertake due diligence into a proposed WCMG power option proposed by a third party. The review was to identify the value proposition and understand what options Rio Tinto had to increase their share.
- Rio Tinto Hail Creek Coal Mine, Qld, Rio Tinto. Prefeasibility into the WCMG arising from the underground development. The study included the evaluation of conversion to power, conversion of gas to LNG or CNG for vehicle fuel use and the option to sell into a natural gas pipeline.
- Appin and Tower Waste Coal Mine Gas Project Recontracting, Illawarra Region, New South Wales, Energy Developments. Development team. Worked within a dedicated project team to undertake technical and financial analysis for multiple competitive bids for the 18 year extension to the Appin and Tower WCMG Project.

- Project managing screening studies under a consultancy agreement with Peabody Energy investigating waste coal mine gas generation and abatement opportunities with all their underground operations in Australia.
- Technical development for a Power Station opportunity to supply Peabody Energy's Denham development. The scope included the compression facilities, pipeline and power station assets.
- Development of concept study and business case for open cut mine gas drainage for abatement in the Bowen Basin with Peabody Energy.
- Development and commercial assessment of several technologies including the use of organic rankine cycle (ORC) for waste heat recovery and pipeline purification of waste coal mine gas.
- Investigation into the acquisition of the Moranbah Ammonium Nitrate Complex islanded power station for EDL. Commercial and technical assessment leading to early proposal in principle to Dyno Nobel. Section of the work included a consultancy with Dyno Nobel to provide a gap analysis and readiness report for their operation.
- Developed the 3MW expansion to the existing McArthur River Mine (MRM). Work involved the early development of the opportunities with Xstrata Zinc, development and negotiating the Power Purchase Agreement with internal legal support, and development of the EPC contract for the generation.
- Managed a team that was responsible for identifying the best in class commercial technologies for coal mine Vent Air Methane (VAM) abatement globally. The process leads to EDL developing a preferred supplier relationship with a US provider of regenerative thermal oxidizer.
- Responsible for patent application and development of potential projects based on EDL's application of large scale OCGT and CCGT applications for the use of VAM as air intake for abatement purposes.
- Business Development around clean embedded generation and energy opportunities based around coal mine energy supply utilizing waste coal mine gas.
- Responsible for the development and review of technologies for the processing of waste coal mine gas and landfill gas to pipeline quality. Identification of business opportunities for the export of the gas in the Bowen Basin.
- Grasstree 32 MW Coal Mine Methane Project – Front-end Engineering Design, German Creek, Queensland, Energy Developments. Design manager. Managed and oversaw a small design team to put together FEED package to engage engineering, procurement and construction contractor.
- Appin and Tower 94 MW Coal Mine Methane Project, Illawarra Region, New South Wales, Energy Developments. Commissioning engineer. Responsible for commissioning of plant and systems for world's largest coal mine methane power station.
- Moranbah North 45 MW Coal Mine Methane Project, Queensland, Energy Developments. Managed requirements for turnkey performance contract. Involved in commercial negotiations of gas supply agreement and approval application (IDAS).

Technical Development of Gas (LNG/CNG) and Power Projects

- Concept study into LNG/CNG fuelling for Adani's Carmichael Coal Development. The work looked at the financial benefits of development of small scale LNG plant to supply fuel to mine haul trucks and bulk rail haulage.

- Technical Due Diligence into CSIRO's Ventilation Air Methane Catalytic Turbine (VAMCAT), Brisbane, Energy Developments. Technical manager for investigation and evaluation into potential partnership with CSIRO to develop VAMCAT technology.
- Queensland LNG Plant Project Development, Energy Developments. Technical manager for siting and project development. Optimised technologies to ensure a positive economic valuation.
- Northern Territory LNG Plant Project Development, Energy Developments. Technical manager for siting and project development. Optimised technologies to ensure a positive economic valuation.
- Remote Power Station Proposals and Bids, Various Locations, Energy Developments. Manager of technical and project requirements for proposals and bids to Gwalia Deeps, Moly Metals, Cloudbreak and Gunsons (Western Australia), and Iluka (South Australia).
- West Kimberley Power Project, Western Australia, Energy Developments for Horizon Power. Provided technical oversight and approval for development of CAT 3520C island-mode generator set with Caterpillar USA.
- Yulara CNG 'Virtual' Pipeline, Northern Territory, Power and Water Corporation. Design and commissioning manager. Australian first for transportation of CNG on triple road trains to supply fuel to Yulara remote power station. Project included compression facilities, transport development and approvals, and let down station to supply the Yulara Power Station.
- BHP Cannington Mine Expansion, Cannington, Queensland, Energy Developments for BHP. Engineering manager. Responsible for all disciplines during design. Provided and managed resources for commissioning.

Waste to Energy

- Solid Waste to Energy Recycling Facility (SWERF), Whytes Gully, New South Wales, Energy Developments. Process, instrumentation and controls supervising engineer. Responsible for investigation and process improvement of SWERF plant including management of project upgrades. Involved in commercialisation of SWERF (gasification) process.
- Landfill Power Generation, Georgia, USA, Energy Developments. Engineering manager. Responsible for liaison with US operations to provide project design along with equipment design.
- Belrose Landfill Gas Power Station, New South Wales, Energy Developments. Commissioning engineer. Commissioned complete power station, including control systems, balance of plant and large internal combustion engines.
- Wingfield and Tee Tree Gully Landfill Gas Power Stations, Adelaide, Energy Developments. Commissioning engineer. Commissioned complete power station, including control systems, balance of plant and large internal combustion engines.
- Clayton Landfill Power Station, Melbourne, Energy Developments. Commissioning engineer. Commissioned complete power station, including control systems, balance of plant and large internal combustion engines.
- Lucas Heights One Landfill Power Station and Tower and Appin Pilot Plant, Sydney, Energy Developments. Operations supervisor. Supervised a small team of operators for period that region was developing.