# Executive Summaries

## 2011-2012 Bursary Vacation Placements in Queensland

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During January and February of 2012 I worked as an undergraduate mechanical engineer for Parsons Brinckerhoff in their Brisbane office. Throughout my placement I gained valuable knowledge and insight into consulting engineering within the power industry. I was primarily involved in a solar thermal project which investigated the viability of concentrated solar power plants in South Australia. My contribution to the project included writing the technical review of the various technology options, generating models to simulate each case and estimating the capital, operations and maintenance costs for each option. I was also involved in modelling a sugar mill’s power system in order to optimise it for out of season use.

The aim of this report is to provide an outline of my experiences throughout my time at PB and demonstrate how the position benefited my professional development. This includes the improvement in my technical skills, particularly with respect to modelling in programs Thermoflex and SAM. Furthermore, my non-technical skills benefited from the placement as I gained first-hand experience in preparing reports for clients from the initial stages through to submission.
This report details my learning experience during the work placement which I had at Powerlink Queensland from November 2011 through to February 2012.

Powerlink is the Transmission Network Service Provider for Queensland and a government owned corporation. During my last work placement with this company I worked in the Network Field Services Business Unit; that experience taught me many practical and theoretical details concerning the construction and maintenance of transmission lines. During the placement this year I worked in the Network Strategies and Performance Business Unit and I was able to view power transmission technology from a different perspective; that of substation equipment performance optimisation and record keeping.

Generally my work was to investigate the details of installed equipment and compile or correct data concerning that equipment, or to investigate relationships between records kept in different information storage systems. I feel this placement was a useful learning experience for me.
The three month power engineering placement at Origin Energy’s Darling Downs Power Station gave me excellent exposure to power engineering in the area of generation. The placement gave me a chance to experience a wide range of technical tasks, some unique to generation and others more general to the electrical engineering skill set. I was the only electrical engineer based onsite during the summer period with support and approval being given from the Brisbane based engineers and direction from the sites engineering leader (mechanical engineer) – this meant exposure to a wider range of tasks and a chance to take on some real responsibility.

This report will highlight three projects I was involved in, including partial discharge testing of the generators, isolated phase bus heating control system redesign and root cause analysis of the 6.6kV and 415V bus synchronization issues. Due to the wide range of work and the need to keep records of outcomes, I used a system of writing concise reports for each task I undertook. This allowed me to track my progress through solving each problem and allowed me to effectively communicate technical issues with my supervisor and the experienced electrical engineers based in Origin Energy’s centralized Brisbane office. Each technical challenge I undertook was defined, analysed and then a solution or recommendation proposed in the reports. Often the reports included a table that tracked the progress of a solution to the given problem.

The main benefits I take out of this experience include an improved knowledge base in generator testing, transformer operation and dissolved gas analysis, DC earth trouble shooting, report writing and working with a diverse range of professionals and technicians that a power engineer is likely to come across at a power station.
STUDENT: Carl Harch (CQU)
COMPANY: Stanwell Corporation

For my third placement as an API Bursary holder I worked at Stanwell Power Station near Rockhampton as a Mechanical Engineer for fourteen weeks. I was employed by Dawsons Engineering, a contracting company, working in the Asset Services Projects Group.

I really enjoyed my first two vacation placements in a power station so I decided that it would be good to try a different power station and have the opportunity to compare and gain valuable new learning experiences.

The main projects that I worked on during my placement included finding information and making recommendations for the replacement of the smoke and heat ventilators in the boilers houses and turbine hall, determining requirements for running large portable compressors inside a shed and determining whether a temporary shelter meets the required standards and making recommendations. These tasks have allowed me to develop my skills in working with engineers, interpreting Australian Standards, engineering drawings and plant manuals, as well as researching and communication.

I feel I have developed a good understanding of the power generation industry through working with the Projects department and contractors. I am extremely grateful for my opportunity to engage in this placement at Stanwell Power Station, it has been very rewarding and worthwhile and I feel I will now be able to use the experience I have gained and things that I learnt in my future studies and engineering endeavours particularly in the power generation industry.
As part of my mandatory work experience requirements, I took part in 3 months of vacation employment in the Industrial Engineering department at Alstom Grid’s Rocklea site. In this time I have been exposed to many facets of engineering work and worked intensively on a major project. This report has been prepared for the purpose of providing insight into my experiences and what I have gained as a result.

The majority of my time was spent on a project to upgrade the site’s compressor system. This involved an audit of the factory’s current system capacity and demands to develop specification requirements and a business plan for an upgrade. To accomplish this, I consulted with five different suppliers of compressors and also contractors for various tasks such as roof reparation and pipe work. Towards the end of my placement I gave a presentation to members of management, where I had to present the proposal and also defend my reasoning and cost justification.

With my main focus during this placement being on the compressor upgrade project, I have had much exposure to project work and compressor systems. Perhaps most important was my experience with contractor management, where I developed my communication skills and learnt about running a fair bidding process.

Overall, I would say that my time with Alstom has been extremely valuable. I have improved my personal, organisational and technical skills in ways which are only possible by conducting practical work in an engineering environment. I have no doubt that this experience will prove extremely valuable in my future career.
Over the summer holidays, between November 2011 and February 2012, I was lucky to be employed by Santos as a vacation student engineer. As a company with a strong history in Australia’s resources sector, particularly gas, this work provided me with an interesting view into the industry that helps power Australia’s electricity networks.

During my time with Santos, I worked on a main project designed to provide benefit to not only myself but also the company. This project was to convert a decision making flow chart into software form to be used as a high level design tool for new Santos wells and field developments. In order to complete this project, a number of challenges were required to be overcome. These included converting the controlling parameters inside the flow chart to resemble Australia conditions as appose to the American conditions the chart was originally designed for. This provided a considerable challenge as the gas industry in Australia is quite highly contrasted to the gas industry in America. For example, the cost to construct a well in America is only a fraction of what it costs in Australia however the price that gas sells for is much higher. While this was a challenge, it meant a lot of research into what is viable in Australian conditions was done to produce the final outcome. For this, statistical analysis was used on data for each variable.

One of the issues noticed during my work with Santos was that, even though methane gas from sources such as coal seam gas and natural gas is one of the cleanest fossil fuels available, there is a great deal of resistance to its exploitation and use. This is compared to other much dirtier fossil fuels such as coal. Apart from producing much worse emissions when burnt, the gathering of coal also posed a massive environmental issue, particularly in open cut mines. It is therefore a wonder that coal is used to generate 78% of the power used in the Australian electricity networks, more than any other developed country in the world except Denmark and Greece, while methane is only used to generate 14% (World Nuclear Association, 2011).

This report aimed to relate my time with Santos and some of the experiences and learnings I gained while working there. It also looked at the relationship between the coal seam gas industry and the Australian Power Industry and noted that more should be done to increase this relationship to benefit both the environment and the industries involved.
In the winter break of my third year of the Bachelor of Engineering (Mechatronics) program at the University of Queensland in 2011, I was provided with a vacation employment placement with Powerlink Queensland for three weeks. My placement began on Monday, the 4th of July, and concluded on Friday, the 22nd of July.

In this time, I worked under the supervision of Denise Brown in the Asset Monitoring (AMT) department of the Operations business unit.

The key learning experiences for me in this area were investigating pieces of plant, such as Static VAr Compensators (SVCs) and Current Transformers (CTs), as well as sitting in on the Real-Time Fault Desk, where I learned how to create notifications, service tickets and connect to meters on the Powerlink network.

My time working at Powerlink was enjoyable and educational. Overall, my understanding of the power industry and the roles of engineers in asset monitoring has increased greatly, both through my conversations with professional engineers and the activities I completed throughout my placement.
At the end of my third year of the Bachelor of Engineering (Mechatronics) program at the University of Queensland in 2011, I was provided with a vacation employment placement with the Australian Energy Market Operator (AEMO) for five weeks. My placement began on Wednesday, the 23rd of November, and concluded on Friday, the 23rd of December.

In this time, I worked under the supervision of Jennifer Crisp and Paul Ravalli in the Network Models Division of the Planning Department.

The task I was primarily assigned to was a wind farm integration tool; a scripting package used to integrate detailed wind farm models into network system snapshots for load-flow analysis with the Power System Simulator for Engineering (PSS®E). My contributions included adding several new wind farms to the tool from various Australian sites, as well as updating its documentation.

Additionally, I participated in meetings, social activities and along with a small group of student and graduate engineers, experienced a tour of AEMO’s control centre in Mansfield.

My time working at AEMO was enjoyable and educational. Overall, my understanding of the energy industry and the market has increased greatly, particularly in regards to the processes and tools used in power system analysis. This can both be attributed to the conversations I had with professional engineers, as well as the work I completed during my placement.
This report summarises my experience during my vacation placement with Aurecon over the 2011/12 summer. I was placed in the Power Transmission and Distribution section of the Energy Services group under the supervision of Andrew Senini (Senior Electrical Engineer). This group takes on a variety of power systems projects for a number of clients and has expertise in a range of power systems disciplines including power system planning, substation design, protection engineering, renewable energy and power system studies.

During my time at Aurecon, I undertook several protection relay setting design projects for one of Aurecon’s key clients. I also completed a project which involved the organisation and databasing of a client’s entire catalogue of digital relay setting files.

I was also exposed to power system planning work and completed two projects, which involved investigating particular feeders of an electrical network and determining their limitations. From this, a number of proposed solutions could be developed and tested in order to determine the optimal solution to be suggested to the client.

Through these projects I was exposed to a variety of technical aspects of power systems, in particular protection engineering and power system planning, and my knowledge in these areas has significantly increased. This experience has also provided me with professional development in the field of engineering, which I’m sure will prove to be very valuable in the years to come.

I thoroughly enjoyed my time at Aurecon and am grateful to both Aurecon and the Australian Power Institute for providing me with this work placement.
STUDENT: Christopher du Plessis (QUT)
COMPANY: Powerlink Queensland

For the Christmas holiday period between 2011 and 2012 I worked for Powerlink Queensland in Primary Systems Design – north. This meant all my work was in conjunction with Powerlink assets from Gin Gin to Northern Cairns. Primary Systems Design is a specialisation of transmission engineering, where engineers design substations between 132 kV and 300kV.

This report aims to discuss my work placement at Powerlink Queensland and the specific role I played in Primary Systems Design. It aims to discuss my duties and opportunities as vacation students at Powerlink Queensland and discuss what I have learnt while I worked there.

My summary of Series compensation is exactly that, a summary. The entire talk from ABB took 3 hours and covered many different areas of series compensation. It was a fantastic example of how Power engineers can solve significant problems in the electricity grid. As the demand for Power in Australia and the world increases Power engineers are expected to evolve the current systems to cope. I valued this experience as it allowed me to see what I’m studying; it has allowed me to experience the end results of my hard work and has motivated me to work harder.

The main problem I encountered is acclimatising to the workplace and the engineering tools used to conduct design work. It took me some time to learn all the different types of drawings and what they are used for. This was very interesting and I enjoyed every minute of it. A major problem I encountered involved all the senior engineers and new Disconnectors being installed into substations. There were concerns for flashing over of the Disconnectors when operating the earthing arm. The procurement engineers attempted to make contact with the manufacturer, however the time difference between Brisbane and Canada was a problem. After the investigation the Engineers were satisfied that whilst the arm was rotating the flashover would not occur, however if the arm was stationary at 45 degrees the air would begin to ionise and in a short time a flash over could occur. Factors such as humidity, wind speed etc would also have an effect on this.

I had many experiences like this and found myself immersed in the technical detail, which really appealed to me. I would like to now see the generation side of Power engineering and learn how problems in this sector are dealt with.
STUDENT: Tara Jackson (UQ)  
COMPANY: UGL Limited

After completing my second year of Electrical Engineering at the University of Queensland I was given the opportunity to work with UGL Limited in Spring Hill. While I was working with UGL I was placed in the Infrastructure Sector in Power, Secondary Systems Design. The responsibility of this group is to work with the other teams of UGL to design the Secondary Systems of tendered construction projects.

During my placement the main task I was focussed on was assisting with the Secondary Systems Design of an upgrade to a Powerlink Substation at Runcorn. The Cable Schedules, Panel Designs and Cable Connections were finalised using a range of different documents from Powerlink and UGL. The project taught me how to read and understand plans, find information from documents such as Design Advice and apply it to a basic template, how to work with both Brown and Green Field Projects and the different types of Protection Systems.

While I was with UGL I learnt about another dimensions of engineering that cannot be taught at university. One of these was seeing how everything in a substation fits together in order to provide reliable and efficient operation. It was interesting to find out about the different components that are required in a Substation, such as Capacitor Banks, Bus Bars, Transformers etc. As there is always a need for power, there are always a number of areas that require an upgrade or new infrastructure. To cater for this, UGL is quickly expanding and everyone must work as a team in order to get the desired outcome.

It was an invaluable experience working for UGL over the Vacation Period and has provided me with a greater understanding of the different concepts involved with Electrical Engineering. I am very thankful for the opportunities that have arisen from the API Bursary Program.
In the summer of 2012 I was employed at Tarong Power Station working within the Fuel Team as a Mechanical Engineer. During this employment period I have developed a deep understanding of the operations of a Coal Fired Power Plant, as well as further increasing my engineering design capabilities.

My employment period began with tours of the plant where I encountered many people and learned a great deal about the layout and operations of a Coal fired plant from start to finish. To further my understanding of some areas of the plant I was allowed to perform maintenance tasks such as powder fuel sampling and testing as well as vibration analysis of various different machines around the plant. Whilst performing vibration analysis I was given the opportunity to visit the pump stations located along the Wivenhoe pipeline.

After familiarising myself with the plant I was given several projects such as designing a Monorail Lifting Beam, designing a solution to turn an offline turbine during overhauls, selecting Hazardous Area classified motors and a taste of Project management in relation to upgrading the Coal Feeders.

The design work I performed has greatly improved my ability to think practically and increased my understanding of designing to Australian Standards as well as helping to further develop my CAD drafting discipline. I was able to develop a much deeper understanding of the subject matter of some of the subjects I had studied at university as I was required to apply many of the concepts that I had just learnt. These projects have helped to greatly increase my professional communication skills in interacting with and gathering information from people of various disciplines within the work force.
This report details my experiences working as a Student Engineer for ENERGEX limited at the ENERGEX head office in Newstead. My placement lasted for a period of 12 weeks from the 28th of November 2011 to the 17th of February 2012.

During my time at ENERGEX I worked in the Commercial and Industrial team within the Energy Conservation and Demand Management department. I was supervised for the extent of my placement by Mr. Julian James, project manager for the Commercial and Industrial team.

I completed a number of tasks while at ENERGEX that helped to further my understanding of the power industry. My main project involved collating information about the embedded generators that were under contract with the Commercial and Industrial team after a hot weather event was called and the generators were run. I also created load impact graphs for each of the generators, which helped to verify that they were running as expected.

The other significant project I was assigned involved analysing the impact that the solar grid at the University Of Queensland had on the ENERGEX network. I found that although the output of the panels did have an effect on the grid, it was largely insignificant when compared to the University’s total load.

Overall, my time at ENERGEX was enjoyable and educational. The projects and day to day activities I undertook allowed me to gain an appreciation of the work life of professional engineers and expanded my knowledge of the power industry. I extend my gratitude to ENERGEX and the Australian Power Institute for making this placement possible.
STUDENT:        Ryan Muller (CQU)
COMPANY:        Stanwell Corporation

Over the past four months I have worked as an engineering co-op student at Stanwell Power Station (SPS). I have been stationed in the Asset Services department, and have undertaken a variety of engineering activities in that time. My placement is scheduled to continue until June and as such not all of the activities I have been involved in have reached their conclusion at this time.

This report summarises the activities I have undertaken to this point in my placement, as well as the learning experiences I have received during my time at SPS.

My main tasks during my placement have involved the preparation of work procedures, fault analysis and preparing recommendations for a thermal motor protection relay retrofit. Each of these has presented its own unique set of engineering challenges. The learning opportunities made available to me included the ability to improve my engineering communication skills through preparation of work procedures, development of my ability to analyse faults and identify the root causes, and a greater technical understanding of motor protection systems.

My sincere thanks go out to all who have contributed towards this opportunity to acquire valuable workplace experience. This includes, but is not limited to, the API sponsor companies, Central Queensland University and Stanwell Corporation.
STUDENT: Manisha Senadeera (QUT)
COMPANY: Powerlink Queensland

During the summer of 2011-2012, I was fortunate to receive an opportunity to undertake a three month work placement with Powerlink Queensland, at their corporate office in Virginia.

During my stay, I was assigned to work in the Protection Design Team of the Substation Design Group, within the Engineering Business Unit, an area whose primary role is to design and maintain the protection system under place in Powerlink’s Substations.

Multiple tasks were assigned for my completion; each from different areas of the protection sub-division, thus permitting for a well formed and concluded understanding of the Protection’s sector.

A major task that was completed during my placement was completing the protection settings for two feeders between the Substations at Stanwell and Bouldercombe in Central Queensland.

Other tasks included the logic programming of protection relays, creating fault location correction charts and determining the bus bar protection settings for the project in Eagle Downs.

Having completed my placement, my understanding of Powerlink’s protection methodology of substations has developed immensely. Furthermore, my report writing, logical thinking and problem solving abilities have also improved and I now feel confident in undertaking further study as well as my future employment prospects within the Power Engineering field.

I would like to sincerely thank the Australian Power Institute, Partners and Powerlink for the invaluable opportunity that has been presented to me during my placement in the Vocational Engineering Student Program.
STUDENT: John Sutcliffe (USQ)  
COMPANY: Ergon Energy

With the help from the Australian Power Institute, API Student Vacation Employment Program and Ergon Energy, over the past three months my understanding and comprehension of the vast technical skills required to be a part of this power profession have greatly increased.

Working under the guidelines placed by my supervisor, Mr Wishvajith Wickramaratne, the Principal System Operations Engineer – Southern, I was situated in the Operational Control Centre Systems, Network group in Ergon Energy, 185 Richardson Road Rockhampton.

While working with this group some of my main tasks were to produce monthly Supervisory controls and Data Acquisition, SCADA alarm summaries detailing the occurrence and action required for both analog and digital SCADA alarms. Along with this I also had the opportunity to carry out investigations and follow up remedial load shift work related to the maintenance of electrical equipment.

Throughout my placement I have been challenged with new tasks every week and this by itself, has dramatically increased my electrical engineering skills and workplace experience.

I would like to thank the Australian Power Institute and Ergon Energy for allowing me to undertake this real world experience in the energy sector. I now feel more enthusiastic and comfortable about furthering my studies at university so I can enter the engineering profession with confidence.
During the summer of 2011-2012, I was employed by Powerlink Queensland as a vacation student in the substation secondary systems department within the capacity of an automation engineer.

An automation engineer is involved in designing protection, control and opswan (Operational wide area network) systems within the substation, which entails remote control and monitoring of a substation and provides protection functions for Powerlink assets.

As an intern, I was exposed to various kinds of ongoing projects and was constantly kept updated with the happenings in most projects. A project that I worked on was retrofitting cameras into a network for some regional substations. This entailed going through automation drawings and marking up new fibre/ethernet connections along with new DC cabling and MCB's (Miniature Circuit Breakers) into the existing system.

Some other small projects I worked on were: creating list of materials and coding top-level button-click architecture for a SCADA (Supervisory Control And Data Acquisition) system.

My experience with Powerlink was splendid on a technical and professional level. The engineers provided me expert guidance on the subject and opened up my perspective on engineering. The skills I have gained with this company are unmatched, and will help me tremendously with further study and placements.

I would like to thank my supervisors Mr Sivajith Selvarajah and Mr Guhan Sivakumar for providing me with constant support throughout the placement and also Mr Alfred Koch for giving me valuable assistance on my tasks during my time at Powerlink.
STUDENT: Russell Tsuchida (UQ)

COMPANY: Tenix

Through my ongoing time working with Tenix at Banora Point Wastewater Treatment Plant, I have gained knowledge and experience not only relating to wastewater treatment, but also engineering as a whole.

Whilst my main work dealt with Operation & Maintenance manuals, I was also exposed to control processes and equipment such as motors and sensors. As such, I have acquired and practised skills including reading and explaining technical documents, research, report writing, planning and organisation that can also be applied in Power Engineering.

It is my belief that this valuable experience will help and motivate me to continue working and studying engineering.

I have enjoyed and valued this experience provided by Tenix and API and very much look forward to working on future engineering projects.
Over the summer of 2011/2012 I worked as a substation design paraprofessional for Ergon Energy, at the Banyo Workshops. I have previously worked in this workgroup and I chose substation design for my first vacation placement, as it was this field that inspired me to commence my degree in electrical power systems engineering.

The purpose of this report is to explain how I achieved my objective of further developing my engineering design and project skills, in a substation design context. This report does this by elaborating on the 5 substation design projects that I contributed to over the summer:

- Oakey Substation AFLC RMU replacement
- Completion of 33/11 kV 10 MVA standard skid substation
- East Warwick Substation rebuild
- Westbrook Substation concept design
- 66/11 kV 10 MVA standard skid substation concept design

This report will also discuss the tools and methods that I used to produce the designs and enhance my core engineering competencies.

These competencies include interpreting and developing design requirements of projects. An example of this is the 66/11 kV 10 MVA substation project, where I was involved in discussions with the standards group in developing the design brief.

This summer also saw me prepare conceptual proposals for the Westbrook 110/11 kV substation. I produced the ultimate and initial general arrangements, elevations and equipment lists of the substation. These drawings are used to assist negotiations with local council as well as in preparing preliminary budget estimates for the project.

I worked with substation designers, design engineers, and standards engineers to develop workable solutions. Ergon Energy Standards, Australian Standards and International Standards were frequently referred to determine specifications and requirements for the projects. In addition, I pursued technical brochures and negotiated with sales engineers to select the correct equipment.

To produce the substation designs, I used Bentley Microstation 2004. I used this program to design 2D & 3D models, and wrote a power point presentation on how to efficiently produce a 2D drawing from a large collection of 3D models. This enabled better integration with Document Management System, for both the 2D drawings and 3D models.

I believe I have further developed my skills in substation design over the summer and am grateful to Ergon Energy for providing me with this opportunity.
During the period from December 2011 to February 2012, I was employed by Ergon Energy within the Asset Management unit’s System Development Group, in the Network Development and Forecasting team as a Vacation Student Engineer.

The role required assessing load data quality and availability from newly created analogue tags from Ergon’s ABB SCADA system, updating the spreadsheet records of these load measurement points, and integrating them into the Energy Information Management (EIM) database system that is used by the Group to produce annual forecast reports, view historical load profiles and assist in network planning, augmentation and demand management strategies.

Additionally, I produced a work procedure outlining this process to assist subsequent administrative staff in this role following the completion of employment.

It was a challenging and rewarding period in that it gave me a greater understanding of the vital and varied roles of a Power Engineer in the Australian Electricity Supply Industry. It also afforded me to gain experience in the efficient use of essential software packages and database systems to produce usable information for network management and forecasting staff.

These experiences and skills have greatly benefited my personal development in the progression towards becoming a professional engineer. I feel that I will be better prepared to enter the workforce from this period of work and look forward to building upon the knowledge gained in the future.

I wish to thank my supervisor and colleagues for the help and guidance throughout the time with the company, as well as Ergon Energy and the API for this valuable opportunity of professional development.
The three month employment opportunity provided to me by the Australian Power Institute and Powerlink has improved my understanding of electricity transmission and given insight into the myriad interlocking roles and functions required to safely and consistently provide this service to the State of Queensland.

I spent the vacation employment assisting in the Principal Consultants section of the Engineering Business Unit (EBU) at Powerlink, located at the Virginia office in Brisbane. The varied tasks within Principal Consultants meant that I was able to liaise with and help with tasks involving other parts of the EBU: Asset Management, Communications, Protection and Network Field Services.

My personal development from this placement has included acquiring or polishing skills in:
- liaising with other departments to collect data for analysis
- searching for data and records in Powerlink databases and manufacturer manuals
- preparing Excel spread sheets and PowerPoint presentations
- writing macros for Excel
- analysing collected data then preparing reports from that analysis
- communicating with suppliers to determine their recommended method to safely examine substation switchgear

These skills were used to address tasks in:
- the analysis of network effects for faults in breaker-and-a-half Gas Insulted Switchgear (GIS)
- seeking a protocol from the manufacturer for safe inspection of flange bolts in Hybrid Switchgear (HIV)
- Calculating and presenting information to further illustrate IEC data about DC effects on AC current cut-off time after relay interruption.
- Arranging information regarding substation DC power supplies and controllers as used by Powerlink
- Collecting data from other departments then collating and analysing the information to make recommendations about addressing a fault in relay communications.

It has been a busy, interesting, challenging and fulfilling summer work placement both professionally and personally.
During the summer of 2011 to 2012, I was given the opportunity of working as a Vacation Student Engineer at ENERGEX for 12 weeks. Through this report the knowledge and experience that I gained over the course of my vacation placement will be discussed, in addition to work that was conducted.

My placement at ENERGEX was my first exposure in the power industry, and it allowed me a great insight into the industry. I worked in the Systems Engineering group, within the Network Performance division. During my time spent at ENERGEX I was tasked with conducting an investigation on the 11 kV overhead network in order to determine the optimum backbone conductor. This investigation enabled me to learn about many different aspects of the overhead network. I began by studying the different conductor types and their fault current ratings. Soon my knowledge began to branch out into many areas ranging from tip load calculations to the reduction of conductor tensile strength due to annealing. Often I was required to seek assistance from engineers or other professionals who would guide me through specific topics (such as protection on the network), in order to understand a topic and progress further in my investigation.

By the conclusion of my vacation placement I presented my investigation with recommendations for the 11 kV overhead feeder, with a plan for the future implementation.

The vacation placement has been invaluable in providing a window into the workings of a distribution company. I have discovered how much is involved in the distribution of electricity; far beyond transport of electricity from A to B. Additionally, I have begun to understand how great the scope and diversity of tasks are available within the power industry. I now realise the importance of many areas in ENERGEX, especially of the Systems Engineering group where I spent my time. My time in the power industry allowed me to see the practical applications of the knowledge and skills learnt at university. While I realise there is still a significant amount of knowledge that I have yet to gather, but my time in ENERGEX has greatly improved my understanding of many areas in the power industry.
I was privileged enough to work at Tarong Power Station at the start of 2012. Tarong Power Station is one of the largest coal fired, sub-critical power stations in Queensland. I was situated with the generator operations department, majoring in Electrical Engineering.

While I was there I was assigned to re-write a program that had originally been written in the nineties, to make it compatible with their new Hioki Chart Recorder. This involved me learning Visual Basic and editing a Marco in Microsoft Excel. I also looked into the sensors for a new Eddy Current Coupling Tarong is looking at buying. This required me communicating with engineers over at DriveSourceUSA (the company that produces the ECC) and comparing their offer to our original system. I carried out a few minor jobs as well, from working in the workshop to beginning to research replacement power transducers for one of the other engineers.

My time working at Tarong Power Station was an incredible experience. I learnt about key electrical details, such as arc flash, shorted turns, eddy current and electricity production. As well as this, I learnt what working in an engineering company is like, how it is run and what work is required before you can even start a job. I also experienced office etiquette and procedures, such as weekly meetings.

My time at Tarong Power Station has sparked my interest in Electrical and Power Engineering. I can’t thank the API and Tarong Power Station enough for giving me the opportunity of a life time and letting me work there over the summer break of 2012.
During January-February 2012 I was granted vacation practice as a mechanical engineering student at Stanwell Power Station, just west of Rockhampton. During my 6 week stay I worked with mechanical engineers, draftsmen and electrical engineers and learned a variety of skills required to operate in an engineering field.

I was able to actively take part in maintenance activities such as resolving trip hazards, finding leaks in air extraction systems, beginning design of a transport cradle for a Booster pump and most importantly compiling an interactive spreadsheet/survey of all the motor and pump bearings in the Power Station. This survey, along with further research led to making real practical recommendations such as using a lower viscosity grease. This recommendation was eventually granted approval for an experimental trial in a Seal Air Fan with promising outcomes. Selecting particular lower viscosity grease (after much research), the operating temperature of this equipment was reduced to 16.5°C, a saving that will result in extended bearing life and thus a significant financial gain for the company. It was highly rewarding to see my small vacation contribution had the potential to make such a difference.

My research, communication, data collection, technical knowledge and practical skills all benefited greatly from this experience, which I am thankful to Stanwell and the Australian Power Institute for providing.

Overall, I would highly recommend to any engineering student to apply for vacation work at Stanwell Power Station or any Power Station for that matter. Not only because of the massive range of machinery on site but also due to the more practical experience of engineering, where your work will have significance and value to real world applications.
In the summer of 2011-12, I was privileged to gain vacation placement with Ergon Energy, which is primarily a power distribution company.

During this 10 week vacation placement, I was assigned to the Network Reliability business unit of Ergon Energy. Through this course of employment I gained valuable experience in the power industry, particularly in the area of power distribution and network reliability. My technical understanding of a range of concepts, terminologies and standards in the area has now significantly increased.

As part of the unit, my main task over the course of employment was to conduct root cause analysis of various types of outages. It mainly involved the use of MS Excel 2010 to produce the appropriate tables and graphs from a large volume of data, sourced from the programme FeederStat, to perform in depth analysis of causes for favourable and unfavourable trends and discrepancies in the outage data. This is then used to present possible solutions to improve the network reliability attributed to the particular type of cause for the outages.

As a result, my analytical, research, report writing and organisational skills have benefited immensely from the experience. Thus, I feel better equipped to undertake further study and employment in the engineering profession.

Finally, I would like to extend my sincerest gratitude to the Australian Power Institute (API), its sponsors and Ergon Energy for providing the electrical engineering vacation placement.
My three months with ENERGEX was a rewarding experience. I worked in Network Data & Property, specifically Strategic Planning. In this group I was exposed to some of the many complexities in upgrading and extending a Distribution network.

These technical, community and political challenges often require elegant solutions in order to overcome limitations and hurdles. Many of the actions provide an essential service toQueenslanders and are not visible to the general public. Observing the processes required to make these actions happen in a managed and transparent way was an excellent way to learn more about an industry, which I know very little about at this stage in my education.

My roles during my time with ENERGEX involved learning how to interpret and create technical diagrams, use mapping software to retrieve information on the Greater Brisbane electrical grid, retrieve data utilising SQL, and present my work in meetings relevant to current projects to some level of accuracy and be able to join in discussion on them.

The learning curve was often quite steep, but all the more satisfying because of it, and thanks to the supportive group I worked with I never needed to hesitate if I had a question. I look forward to seeing how the wealth of experience I have gained will compare and compliment my undergraduate studies.

I cannot express how rewarding my time with ENERGEX was, and wish to express my gratitude to my workmates for their encouragement, advice and patience provided at every step.
During my three-month vacation placement at ENERGEX, I received an invaluable exposure to Australia’s power industry. The placement developed a practical context for electricity distribution around the theoretical knowledge I have already acquired through my studies.

I was employed as a Student Engineer within the Network Performance division at ENERGEX, where I worked with the Demand and Risk Management Group among the Residential Strategy Team.

My major contributions were focussed in both an innovative and technical space, particularly on an initiative which aimed to achieve a peak demand reduction through the use of *peaksmart* air conditioning technology. I was tasked to design and conduct a standardised testing procedure for this technology, and assess its feasibility in both social and technical respects. I additionally performed a number of data modelling exercises, analysed meter data sets, reviewed a number of existing reports, and presented investigative findings verbally through meetings and written-reports.

This placement has greatly benefited my understanding of the distribution network, as to how various elements integrate together to perform a critical function in the total power delivery process. I have also procured a better understanding as to how social, economic and environmental perspectives impact technical engineering projects.

I sincerely acknowledge and thank all staff who readily addressed my many queries and continually offered advice and suggestions, in addition to the Australia Power Institute for providing this excellent opportunity!
As a recipient of the Australian Power Institute (API) Bursary for 2011 I was given the opportunity to work as a Vacation Student at Ergon Energy for the summer vacation 2011/12.

I was provided with a mentor at Ergon Energy, within the substation standards group; Qui Dinh. As my mentor Qui provided me with valuable knowledge about the power industry, always having answers to my many questions.

One of the first tasks that I undertook at Ergon Energy was that of familiarising myself with the group I was working in, Substation Standards. This included a review of policy and procedure manuals.

The first project that I undertook was modernising the substation standards into a joint Ergon/Energex standard and creating a new abbreviations standard for reference when either designing a new standards or interpreting previous. The goal of this modernisation and creation of a new standard was to create an easier to understand system for everyone involved in the process.

Another project was that of creating Excel spreadsheets that would provide calculations for commonly performed operations using functions, macros and scripting. These spreadsheets save time by removing repetitive tasks and providing consistent results.

An interesting aspect of my program was discovering what Ergon is doing into the future, including a proposed wind farm development at Kidston and further projects related to managing demand.

The energy industry is currently in the spotlight and in a transformational phase, whereby the network is being tested on all fronts. Including feeding electricity into the grid from household solar panels, large loads generated from electric cars and a more diverse generation base. This added with the growing costs associated with distribution mean that the energy industry is being further scrutinised and therefore must come up with new innovative solutions to ensure the future reliable supply of electricity.

I am extremely grateful for having the opportunity to work in the substation standards group at Ergon Energy and believe that I have learnt much about the power industry and the many challenges facing it into the future.
Over the 2011/2012 summer I was employed by Ergon Energy as an electrical engineering student in its Generation Asset Management Department in Cairns.

My employment mainly dealt with exploring the challenges of integrating renewable energy sources into small grids. These challenges centred on the intermittent nature of renewable sources and the sudden increase in load placed on a power station when these intermittent generation sources dropped out.

My largest project was to analyse the risk exposure to power outage for various levels of solar PV penetration on a site by site basis. I developed a program that calculated the risk exposure using several variables including load data, irradiation levels, generator capacities, and solar PV system size. A limit of solar PV was then recommended based on an acceptable amount of risk exposure.

Other projects assigned to me included writing an algorithm that enabled dynamic control of generator spinning reserve, investigating fuel savings for various levels of solar PV, and to prepare a trial strategy for automatic fuel gauging in bulk diesel storage tanks.

The experience has been extremely valuable in providing me with an insight into the challenges of distributed generation and has helped me in my career path of becoming a Power Engineer.