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# Renewable Energy and Distributed Power Australasian Experience



## **Sustainable Energy Technology Review**

SEDA conducted a study into the possible scenarios for the sustainable energy industry over the next decade. GHD provided technical assistance with study, including identification, analysis and case studies of key sustainable technologies and input to a detailed case study regarding the feasibility of a wind-turbine manufacturing base in NSW.

## **Biofuels at Ord River**

The client wished to convert sugar cane to ethanol and other fuels. GHD provided a first pass mass and energy balance, and indicative economics of the proposed installation.

## **Port Phillip Bay Wind Farm Preliminary Assessment**

GHD provided professional advice to determine the viability of the proposed wind farm, including assessment of wind resources and analysis of potential political and social opposition to the project.

## **Power Facilities – Pindari Hydro**

GHD was engaged by Power Facilities to act as owners engineer for this 5.5MW hydro in northern NSW.

## **90 MW Wattle Point Wind Farm**

GHD conducted a technical due diligence on the 90 MW Wattle Point wind farm in South Australia for a prospective buyer of the asset. The study included review of all project documents

## **50 MW Geothermal Plant Study**

GHD provided an engineering study and cost estimates for the plant to assist enable a client to determine the viability of the project in South Australia.

## **Alcoa Biomass Power Project Study**

GHD provided advice to Alcoa on how they could best take advantage of the options available to them for the utilisation of the biomass resources available from forest residues from mining operations, Alcoa farmlands and other farms in the Peel region for the production of power, steam, metallurgical charcoal and other products.

## **Social Impact Assessment for Newfield Wind Farm**

GHD undertook a comprehensive community engagement and consultation program for Acciona Energy's proposed wind farm in Newfield, Western Victoria.

### **Sydney Desalination Plant Greenhouse Emission Advice**

The proposed Sydney Desalination Plant project required advice to determine how to offset the greenhouse gas emissions resulting from its power consumption. GHD reviewed the alternatives for providing offsets to the proposed plant's carbon emissions to a variety of levels and from a variety of sources, including provision from the grid, carbon sinks, solar energy investments and other green technologies.

### **City of Whitehorse Renewable Energy Feasibility Study**

The City of Whitehorse required an analysis of its options for generating power from renewable energy sources. GHD provided a Renewable Energy feasibility report, which concluded that the most appropriate options was the installation of solar panels on the roof of the Civic Centre and other community buildings. The analysis included triple bottom line feasibility, including the life cycle cost, social and environmental considerations of the installation.

### **CSIRO Energy Centre Newcastle**

GHD through its company Flack & Kurtz Australia investigated and carried out design of energy sourcing, conservation and management systems for the CSIRO Energy Centre at Newcastle. The renewable energy sources used included wind turbines, building integrated photovoltaic cell arrays, fuel cells and micro-turbines. Other sources looked at in feasibility, included cogeneration, tri-generation, and solar hot water heating and geothermal heat pump systems.

### **Confidential Client- Green Waste Fuel Study**

GHD was engaged to assess the quantity, quality and cost of green waste in South East Queensland, which would be suitable for a green waste energy plant. The study included considerable consultation with the suppliers and potential suppliers of green waste.

### **Rous Water – Toonumbar Hydro**

GHD provided all the necessary consulting services to Rous Water for the successful tendering and then construction of this mini hydro on the existing Toonumbar Dam. These services included feasibility and optimisation studies, bidding, government grant application (successful), environmental approvals, retail negotiations, network connection agreement, engineering, project management and commissioning.

### **Macquarie Generation – Biomass Co-firing**

GHD assisted Macquarie Generation in the potential cofiring of biomass in their existing pulverised fuel power stations. This work included fuel sourcing studies, determination of availability of REC's and at what cost and preliminary design of the infrastructure necessary to support this cofiring.

GHD also helped prepare Macquarie Generator's "Greenhouse Challenge" document.

### **Water Corporation (W.A.) – Sludge to Oil Plant**

GHD specified and provide technical advice to WCWA for this 30 dry tonne per day sewerage sludge to oil plant. This project is the first commercial application of the ESI Enersludge low temperature conversion process.

### **SMHEA – Valuation of the Snowy Mountains Hydro Electric Scheme**

GHD was engaged by the Snowy Mountains Hydro Electric Authority to provide a valuation of the overall Scheme including all civil, mechanical and electrical assets. In 2000, GHD updated this valuation and compared it with an Optimised Depreciated Replacement Cost Valuation.

### **EarthPower Technologies Sydney Pty Ltd – Camellia Cogeneration**

GHD was engaged to select suitable gas reciprocating engines to use biogas produced from an anaerobic food digestion process as part of a high nutrient fertiliser production facility. The engines were selected and configured as cogeneration plant to produce renewable electricity as well as using the waste heat from the engines, exhaust and engine jacket water, to provide heat for the fertiliser manufacturing process. GHD produced a tender specification and carried out tender analysis to allow EarthPower to award a contract for the design and construction of a 3 x 1.3MW cogeneration facility.

### **Tidal Energy Australia – Derby Tidal Power Station**

GHD provided the hydraulic and power modelling to optimise the return from this unique 48MW tidal power station. This commission also included design and construction cost estimates.

### **Various Clients – RAPS**

GHD have performed numerous commissions associated with Remote Area Power Supplies, which include renewable components such as photovoltaic, wind and hydro. These assignments have covered schemes throughout Australia and the Pacific Islands and vary from prefeasibility studies to design, construction and commissioning.

### **Public Works Department – Coffs Harbour Water Supply**

GHD performed feasibility studies of installing mini hydros in three locations within this scheme to generate electricity from excess head available in the pipelines.



### **Confidential – Water Network Mini Hydro**

GHD performed feasibility studies of installing mini hydros in place of pressure reduction valves within suburban water distribution systems. Similar facilities were also considered in a steeply graded sewerage collection system.

### **Golden Circle Cannery – Biogas Boiler**

GHD was engaged to provide the replacement of three 10MW manually stoked coal fired boilers, which provide process steam. Part of this replacement included a gas recovery system and fire tube boiler to utilise the biogas from the on-site UASB treatment plant.

### **Stapylton – 18MW Green Waste to Energy Plant**

GHD was engaged initially by a prospective equity party and later by a financial institution to carry out due diligence on a proposed green waste to energy plant at Stapylton Queensland. The plant consisted of a single fluidised bed combustor feeding a single steam turbine and generator connected to the local electrical distributor. Since the plant owners were seeking to achieve green power certification for the plant considerable efforts were put into identifying the source and reliability of supply of the green waste. Other issues which were critical to the process included storage and materials handling of the waste prior to combustion. Detailed assessment of the boiler performance was carried out in comparing the design to previous projects around the world. Overall capital and operating costs were examined.

### **McCain Foods Ballarat – Biogas Recovery**

GHD was engaged to provide detailed design, project management and construction phase services for biogas recovery from two 28ML and 10ML industrial waste product anaerobic lagoons. The project included collection of biogas and combustion in a 3MW steam boiler, producing process quality steam.

### **Bunge Foods – Piggery Waste to Energy**

GHD was commissioned to perform a feasibility study into waste to energy from Australia's largest piggery. Consideration was given to both electricity generation and/or heating replacement for the piggery and abattoir.

### **Energetech – Wave Energy**

GHD was commissioned to design the electrical interconnection and control system for a 300kW wave to energy plant to be built at Port Kembla. The wave to energy conversion is via a patented system that includes a parabolic wall to reflect and focus the incoming waves, an oscillatory wave chamber, a turbine that via a blade control strategy transforms the energy from the chamber air flow into uni-directional rotational power driving a flywheel/induction generator.

### **Transfield – Torrumbarry Weir Hydro**

GHD was engaged to provide environmental services and design for a low differential head 6MW mini-hydro BOO project, in conjunction with specialist turbine supplier. The Turbine is located across the closure embankment, adjacent to the new weir, which was previously designed by GHD.

### **Transfield – Hay Weir**

GHD was engaged to provide environmental services and design of this low differential head 4MW mini hydro BOO project in conjunction with the specialist turbine supplier.

### **Various Wastewater Treatment Plants – Biogas Recovery**

GHD has been involved in a number of projects, which involve biogas recovery for energy recovery or odour control. This has included studies, design and construction of each of the various elements.

### **Eraring Energy**

GHD carried out a high-level feasibility study into upgrading the hydroelectric stations at Brown Mountain and Hume Weir. The stations are in the 5MW range. The business case has shown that a more detailed feasibility study is warranted. GHD is carrying out the detailed study.

### **Cleanaway - Waste to Energy Cotton Industry**

GHD undertook a due diligence for Cleanaway on a proposal they were pursuing from Novera Energy. Novera Energy was offering technology by Biomass Energy Services and Technology (BEST). The plant, capital costs in the order of \$3 to 4 million, was to be constructed at Narrabri at a cotton gin, gasifying the cotton waste, cellulose fibre, to produce steam and hot water for use at the gin. The waste to energy plant would replace LPG fired equipment. A future stage of the plant was to include production of electricity.

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