TES
Total Energy Solutions

CASE STUDY 07

The Prince Charles Hospital, QLD

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PROJECT SUMMARY

Location: Rode Road Chermside, Qld 4032

Building Type: Multiple Buildings, up to 5 floors

Generation technology: 1.6 MW Gas-fired cogeneration plant

Installation date: 2010

Typical daily output: 34,800 kWh electrical.

Typical daily building energy use: 48,000 kWh (Average)

Cost (capital): $3,360,285

Cost (operation): $704,089 in Gas, $86,006 Maintenance

Annual cost savings: $1,223,667 in electricity savings

Estimated payback period: 5.1 years

Annual greenhouse emissions: 6,906 Tonnes saved pa.

TECHNICAL SUMMARY

The Prince Charles Hospital

■ **Size (m2), use, types of facilities, energy ratings**

- The Prince Charles Hospital is a major tertiary level cardiothoracic referral hospital for Queensland, the largest such unit in Australia and one of the largest services of its type in the world. The Hospital is also the District hub for specialist needs in psychiatry, geriatric medicine, orthopaedics and aged care. Following redevelopments in 2007, services now include general medicine and general surgery.
- Consists of a total of 23 significant buildings over approximately a 30 ha area.

Technology – Gas-fired Cogeneration

■ **Description of on-site generation technology**

- 1.6 MW Cogeneration Plant – combined hot water, steam and electricity generation utilising a natural gas fired reciprocating engine.
- Designed and installed by Total Energy Solutions (TES) in 2010.

■ **Hours of operation?** 24/7 hours expected minus maintenance = 8660hrs/yr

■ **Daily output (kWh)?** 34,800 kWh/day

■ **What is the expected lifespan of the generation facilities?** 15 years

■ **How much of the building's energy demand is satisfied through these technologies?** 70%

■ **How is the technology monitored and maintained?** Monitored locally and remotely and preventative maintenance performed by hospital staff and engine manufacturer.

■ **At what cost?** Estimated maintenance costs range from $86,000 per year over 15 years

■ **Fuel source and costs?** Natural Gas $10/GJ

Continued Overleaf

Technology – Selection

■ **Why did you decide to use this technology?** Generates substantial energy savings and provides a large reduction in GHG emissions, proven & reliable technology, lean burning gas engine provides reduced fuel consumption and emissions.

■ **Were any other energy generation options considered?** Minor amount of solar PV, gas turbine

■ **What are the main benefits cogeneration delivers?** Electricity generation with heat recovery to offset other energy consuming heat generation streams, at significantly cheaper cost to client.

■ **Other energy generation or energy efficiency initiatives onsite, eg high efficiency lighting/ Improved HVAC system?** Variable speed drives on Pumps, Heat Pump for DHW generation, Energy Efficient lighting for over 3,000 fittings, Building Management System optimisation for energy reduction.

Grid Connection

■ **Details about grid connection, e.g. are you required to draw a certain amount of electricity from the grid as a 'buffer'?** Yes Energex require 20kW minimum but a better safety margin is maintained of 200kW

■ **Type of connection agreement?** Deed of parallel agreement with no export

■ **Feed energy back into the grid?** How much and when? NIL

■ **Business Model: grid feed in?** Revenue from on-sell to tenants? NIL

Air quality and noise impacts

■ **How are impacts managed?** (e.g. NOx, SOx, PM) NOx emission reduction, using a Selective Catalytic reduction system reducing NOX emissions from 200ppm to 18ppm and represents World's Best Practice technology. Choice of natural gas fuel source also reduces particulate (PM) and sulphur (SOX) emissions.

■ **Are you required to report on your air emissions?** No

■ **What is the noise impact and how is it managed?** (e.g. insulation etc.) A Sound proof enclosure and specially designed heat dump radiators, reduces noise levels to below that of the existing gas steam boilers to 80dBA. Plume dispersion modelling and sound level measurement pre and post undertaken in surrounding residential area for background creek and council approval.

Barriers

■ **What issues did you encounter in design, commissioning and in early days of use?** Design of electricity generation to hospital HV ring main and replacement of existing transformer and HV switchgear, real time kW feed signal from Energex revenue meter to ensure safety margin met, environmental impact (noise, air dispersion), Selective Catalytic Reduction System commissioning

■ **Anything unexpected? What was most difficult? Easy?** Limited space for plant and equipment caused many tight bends in the exhaust system producing higher than expected exhaust back pressures during commissioning, engine operating well at back pressure.

■ **Other bodies consulted with (eg local/state/ federal governments, other facilities?)** EPA and Council were consulted regarding DA for fuel burning.

■ **Reports and applications/licences required?** Type B Gas appliance registration and approval obtained.

DETAILS

Owner Queensland Health
Facilities Manager Tony Collins (Queensland Health)
Developer Total Energy Solutions
Builder Total Energy Solutions
Architect Total Energy Solutions
Commissioning Total Energy Solutions

Websites www.health.qld.gov.au/northside
www.tesaustralia.com.au